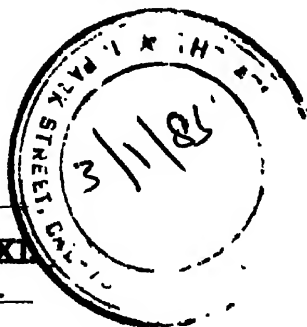


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THE
(INDIAN ANNALS
OF
MEDICAL SCIENCE.)

Vol. XL



CALCUTTA:

R. C. LEPAGE AND CO., 2, DALHOUSIE SQUARE,
PRINTERS AND PUBLISHERS.

LONDON:

LONGMANS, GREEN, READER AND DYER, PATERNOSTER ROW.

MDCCCLXVII.

"I hold every man a debtor to his profession, from the which, as men of course doe seeke to receive countenance and profit, so ought they of duty, to endeavour themselves, by way of amends, to be a help and ornament thereunto."—BACON. •

NOTICES.

**The following Publications have been received in
Exchange with regularity.**

The Dublin Quarterly Journal of Medical Science.
The American Journal of the Medical Sciences.
The British Medical Journal.
The Medical Record.
Gazette Hebdomadaire de Medicine et Chirurgie.

The following Works have been received for Review.

Fayrer's Clinical Surgery in India.
Gordon's Army Hygiene.
Smith's Report of the Madras Medical College, for 1865-66.
Oldham's Memoirs of the Geological Survey of India, Vol.
V. Part 3.
Oldham and Stoliczka's Paleontologia Indica, V. 1—4, Cretaceous Gastropoda of S. India.
Dr. W. A. Green's Report of the Government Charitable Dispensaries in Bengal, for 1865.
The Sanitary Commissioners' Second Annual Sanitary Report for Bengal, for 1865.
Stewart Clark's Annual Report of the Dispensaries of the North-West Provinces, for 1865.
Woodford's Annual Report of the Calcutta Police Pauper Hospital, for 1866,
Ewart's Catalogue of Pathological Preparations in Medical College Museum.
Naylor's Diseases of the Skin.

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ON LITHOTOMY AND LITHOTRITY,

IN THE

PUNJAB AND NORTH-WEST PROVINCES :

BY

H. M. GREENHOW, F.R.C.S., LOND. AND EDIN.,

SURGEON, BENGAL ARMY.

THE subject of Lithotomy must ever be of interest to the surgeon, and more especially so to the Indian surgeon, under whose notice cases of stone are constantly brought. Mr. Erichsen, indeed, in his excellent "Surgery," says, "it (calculus) is generally more frequently met with in cold than in warm climates ; indeed in tropical countries, I believe, the disease is scarcely known ;" but, in the northern parts of India, stone is proverbially common, and the natives there have been, for many years past, accustomed to seek relief from it, at the various dispensaries established by Government for their benefit. There is something very satisfactory to them in lithotomy, when they can see the cause of so much suffering removed, and can actually handle it after its extraction ; hence the operation is very popular among them.

IN No. XX. of the *Indian Annals*, my friend, Dr. Fayerer, has given a short series of lithotomy cases occurring in the Medical College Hospital, Calcutta, which shows that calculus "is neither of very frequent occurrence in Lower Bengal, nor are the results of the operation very successful;" and in the medical journals of India are frequently to be found records of small groups of cases, or even single cases, which prove the interest the subject excites in the minds of surgeons in India.

Considering that some valuable information might be gained by collecting the experience of a number of surgeons, many of whom have practised lithotomy as often as the great hospital surgeons of Europe, I wrote, in April and May last, to about forty civil and other surgeons in the Punjab and North-West Provinces, requesting them to favour me with all the information possible on the following points, *viz* :—

1. The nature of the operation each prefers, and the sort of instruments he uses in its performance.

2. Whether he generally cuts freely, or dilates with the finger.

3. Whether he introduces a tube, or piece of oiled lint after the operation.

4. Whether he gives chloroform as a rule, and if any ill-effects have followed its use.

5. Whether he has had any experience of lithotrity, or of the operation performed by Dr. Murray, Inspector-General of Hospitals. In addition I asked for a return in the form marked Table I., embracing the cases each might have had in his own practice, or that might have occurred at his

dispensary; together with any other information he might be able to communicate, especially with regard to the mortality after the operation.

From twenty gentlemen I have received most courteous replies; and the valuable facts and opinions thus gained, I have arranged for the most part in the order in which they arrived. The principal points are shown in Tables I, II, III., and IV.

Before, however, entering more particularly on these cases, I would make a few remarks on the subject of lithotomy generally, and would first advert to an opinion expressed by more than one of the surgeons whose observations follow, that lithotomy in India will, in all probability, never be supplanted by lithotrity. It is true that that able operator and great authority, Mr. Henry Thompson, holds; (*Vide the Lancet* of February 24th, 1866.)

1. That lithotomy is capable of freeing elderly patients from stone at very small risk, if well-constructed instruments, with delicate manipulation be employed, and if watchful care be exercised in the management of the patient.

2. That the success of lithotomy has never been in any way comparable with that which I have been able to report as the result of the crushing operation. The measure of this success is deduced from a series of forty-four consecutive lithotrity cases, occurring in the years 1864 and 1865, among which there was but one death, and this too when the average age of the patients was sixty-two years. But however great the success of lithotrity, when well-constructed instruments and delicate manipulation can be ensured, I believe that in India, at all events for many years, lithotomy

must continue to be *the* operation ; and for the following reasons :—

1st.—Government have not provided lithotritry instruments, and are not likely to do so for some time to come.

2nd.—As there are no instruments, so Indian surgeons can have had but little practice in the delicate manipulation so necessary to success. I am not aware that lithotritry has been practised even in Calcutta, but believe not ; at all events it has not been extensively performed there. Indeed, as Mr. Thompson says in his Work on “Practical Lithotomy and Lithotritry,”—“Lithotritry is the product of rapid growth. Forty years ago it was but a theory. * * *. The lithotritry of to-day is not the lithotritry of even ten years ago, but a safer and a better operation.” Dr. Ince, indeed, considers lithotomy “the safer and more effectual operation ;” while Dr. Smith, who has tried lithotritry, would, “unless there was some very special reason, always prefer the cutting operation.” As in England so in India, however, surgeons would doubtless learn to manipulate the necessary instruments in an effective manner, were there not a more powerful objection still, *viz* :—

3rd.—The extreme reluctance of the natives to remain long under treatment in a dispensary. As Mr. Lyons says, “with them, time and a speedy cure are great desiderata ;” and this is so true that they frequently cannot be induced to remain, after having undergone lithotomy, till the wound is healed, but insist on going back to their homes almost immediately. Moreover, as has been already noticed, the natives know and understand lithotomy, and it is very satisfactory to them to see the stone extracted whole.

It is tolerably evident then, I think, that, for some years to come, at all events, lithotomy will in India be preferred to lithotrity.

Mr. Thompson arranges the various kinds of lithotomy in two classes—the Perineal, and the Supra-pubic. The perineal he divides again into Lateral and Central. It will be found that, in this paper, a slightly different arrangement has been adopted, and this has been necessitated by the manner in which the surgeons themselves have named their modes of procedure.

1st.—The *lateral*: by which is meant the ordinary generally understood, as Cheselden's, performed either on the right or left side, or, in cases of very large stone, on both sides.

2nd.—The *median*: or that now generally called Allarton's, or some modification of it.

3rd.—The *supra-pubic*.

4th.—Dr. Murray's: a modification of the lateral, which has been invented and much practised by our able and well-known Inspector-General of Hospitals. Through the kindness of Dr. De Renzy, Civil Surgeon, I had, in April last, the opportunity of seeing Dr. Murray perform this operation, which in his experienced hands appears to be very successful. The patient was a child, seven years old, admitted into the Mooptan Dispensary, and the mode of operating was as follows:—A staff with a median groove having been passed into the bladder and the stone felt, Dr. Murray depressed the handle so as to make the convexity of the staff push forward, and render prominent the superficial parts of the perineum. Resigning the staff into the hands of his assistant, Dr. Murray now felt with his left fore-finger for the groove, and, dexterously enter-

ing the point of his scalpel straight into it, divided a short portion of the urethra; he then drew down the knife between the anus and tuberosity of the ischium, dividing the superficial structures freely, and so completing the first step of the operation. He next passed a probe-pointed bistoury (I think Sir William Blizard's) straight into the groove, and, taking the staff in his left hand, pushed on both staff and bistoury *together* into the bladder, which was reached without any difficulty by the bistoury, guided as it was by the staff. Dr. Murray now withdrew the latter, the bistoury remaining in the bladder: this completed the second stage of the operation. The operator then introduced his finger along the back of the knife, using it as his guide to the bladder, and having felt the stone, pressed slightly on the bistoury, producing, as he thinks, a division of the prostate which is partly a pure cut, and partly a laceration. He then withdrew the bistoury and introduced a scoop, between which and the point of his finger he very easily extracted the stone, which was a small one. No bleeding or other outward symptom occurred, and the patient made a good recovery.

The operation was over in a couple of minutes, and was certainly most dexterously performed; and Dr. Murray states that for years past he has been accustomed to operate in this manner, which he finds superior to any other.

It may be well to recapitulate the peculiarities of this operation, and to glance at what may be considered its advantages and disadvantages.

1st.—The entering the point of the scalpel directly into the groove, is a proceeding easy of accomplishment in a thin lad, and where the staff can be felt in the perineum; but in a stout adult with a deep perineum it must be very different, and in such a case, that very difficulty in hitting the staff

may arise at this, the first step in the operation, which Dr. Murray so much dreads, especially in young operators. The importance of reaching the staff successfully is of course great, as the whole operation depends on it; but, the probe-pointed bistoury having been inserted into the groove, a second disadvantage becomes apparent, *viz.*, the difficulty of carrying on the bistoury and staff together into the bladder. If the staff should have slipped out of the bladder by being drawn too much forward, or should the bistoury not cut so freely and easily as it ought, or should the latter be held at an incorrect angle to the staff, it would appear that great difficulty and even danger might arise. On the other hand, by carrying the knife and staff *together* into the bladder, no slipping out of the groove can occur, and the chances of wounding the important structures near are avoided. Dr. Murray has not experienced any difficulty in the proceeding, and believes that it is safer and easier than Cheselden's operation; nor does he consider that the urethra is divided too far forward by this method, or that there is any danger to the artery of the bulb.

The bistoury is an excellent guide to the finger into the bladder, and as the size of the stone can be ascertained by the finger before the knife is withdrawn, the latter can be made to divide as much or as little of the neck of the bladder as may be judged desirable. It is best to use a probe-pointed bistoury, for fear of wounding the bladder when carrying the knife into it.

Having thus sketched the kinds of lithotomy whose results are shown in the following Tables, I proceed to give the information received from the gentlemen who have so kindly favoured me with their experience and opinions.

My friend, Assistant Surgeon S. C. Courtney, 1st Punjab Cavalry, in Civil Medical charge at Dera Ismail Khan, sends

a very complete return of 32 cases, that occurred in his practice between May, 1865, and May, 1866. With regard to the first point enquired about, he says—"I am accustomed to perform two kinds of operation: first, the ordinary lateral, using a curved staff with central groove, and an ordinary scalpel. I incise the prostate moderately and dilate with the finger, if necessary. Second, the median operation, a modification of that called Allarton's, I believe. In this I make a central incision down to the groove of an ordinary staff, introduce a probe into the bladder, and dilate the prostate without incision by means of the finger, or oftener by Weiss's dilator. I have had fair success with this operation, but am still doubtful whether it gives any better result than the ordinary lateral."

2. "I make a free external incision and cut the internal parts as little as I can help, preferring to *dilate*."

3. "In the case of adults I often use a tube,—silver female catheter,—for 48 hours. In that of children generally nothing whatever."

4. Gives chloroform, and never saw ill-effects from it.

5. No experience of lithotripsy.

Dr. Courtney states also that he saw Dr. Murray perform his operation twice, and says—"My opinion can have little weight with reference to so accomplished an operator, but I venture to think that the internal incision is excessive, and that the crooked course of the wound is likely to stop the free exit of urine." Both the patients operated on by Dr. Murray died, but Dr. Courtney does not attribute the fatal result in either case to the operation: he adds with regard to the latter, "I am unable, however, to recognise

that it possesses any advantages over the regular lateral operation."

Dr. Courtney met with hæmorrhage in four of his cases. He had two cases of stone in females during the year; in both he dilated, and extracted the stone successfully.

My friend, Mr. W. E. Allen, Assistant Surgeon, 41st Regiment, Native Infantry, and formerly Civil Surgeon of Peshawur, forwards an interesting and complete return of 29 cases on which he has operated during the last five years.

As to the first point he says—"The operation I prefer is the lateral incision. In two cases I operated by the medial incision (Allarton's), and I think it is a good one for old men, where it is important to save as much blood as possible. I fancy that less vascular parts are cut through; certainly by the old men I operated on I don't think more than two or three drachms of blood were lost. I always use a common scalpel * * *. I think the general introduction of a hollow sound would be a great improvement; it is often so difficult to tell whether a solid sound has entered the bladder * * *. I prefer straight forceps to curved ones, as being more readily guided to the stone."

2. "I always cut freely, dilating (enlarging) the first wound by a probe-pointed bistoury if necessary. I think less harm is done by free cutting, than by the bruising of the soft parts necessitated by forcible attempts at dilatation."

3. In the first six cases used a tube, but since has left the wound alone,

4. Has always given chloroform, and never saw any ill-effects from it.

5. No experience of lithotrity.

Mr. Allen goes on to say that he never picked his cases, and that he had the bad fortune to operate on two old and worn out men who died of asthenia. "A third died from the effects of removing so large a stone (6 oz. 4 drs.); the fourth from bad management of the native doctor * * *." "In case No. 1. I found after entering the bladder by the usual lateral incision, that the stone could not be got through the outlet of the pelvis which was unusually small and contracted; I had no forceps or other means of breaking up the stone, and had recourse to the supra-pubic section. The child made a good recovery." No hæmorrhage is noted as having been met with in Mr. Allen's cases.

Mr. W. C. Kiernander, Civil-Assistant-Surgeon, Jhelum, sends complete statistics of 28 cases he has operated on during the last year. He says, "as a rule, I always perform the lateral operation." Some of the cases have had two, three, and one four, operations performed on them previous to my operating on them, and the hard cicatrices left in the perineum have obliged me sometimes to operate on the right side and once in the median line, making my incision along the raphe * * *. In operating I have never had occasion to use any but an ordinary scalpel; having made a long and free internal incision, I work with my finger till I place my nail in the groove of the staff."

"2. I divide above about one-half of the prostate, and if a large stone, also divide the prostate on the opposite side. I then dilate with my finger only.

"3. After extraction, I wash out the bladder with tepid water, introduce a female silver catheter which I retain in

the bladder for forty-eight hours, and apply a piece of lint wet in cold water to the external wound. I invariably apply leeches, from eight to two dozen, according to the age and strength of the patient, to *all* my cases about four hours after the operation, and watching the cases closely I treat symptoms as they appear."

4. Always gives chloroform, and never saw any bad effects from it.

5. Has not been allowed a lithotrite by Government, so has had no experience of lithotrity.

One of Mr. Kiernander's cases " was brought in in a dying state, and I operated on him as it offered the only chance of saving his life; he gradually sank and died on the sixth day purely from weakness. No hæmorrhage occurred in these cases.

Dr. W. P. Dickson, Civil Assistant-Surgeon, Rohtuck, sends a nearly complete return of 25 cases, operated on by himself during the last year and half. He operates according to Cheselden's lateral method, and uses an ordinary bistoury; for, he says—"I have not a regular lithotomy-knife, which I might prefer.

"2. I just pass the knife in the groove through the prostate, and then introduce my finger, but would not hesitate to cut further should I think it necessary.

"3. I never use the tube or a piece of lint, but leave the wound to heal."

4. Has always given chloroform (except in one case that of an old man), and never saw ill-effects from it in this operation.

5. Has had no experience of lithotrity.

"The death by peritonitis was the result of the operation, the native doctor, allowing the staff (a very short one) to slip out of the bladder, and I had to finish the operation on a director. The other death occurred in a boy, who was evidently dying from the effects of a stone and fistula."

In one case, a woman, the supra-pubic operation was performed; the stone broke to pieces and the greater part of it was lost. Death ensued from peritonitis.

No hæmorrhage occurred in these cases.

Dr. Dickson also sends a return of 29 cases, operated on in 1862 and 63 at the Rohtuck Dispensary by his predecessors, Drs. Taylor and Woodhouse.

Assistant-Surgeon, R. T. Lyons forwards a very interesting return of 153 cases, embracing all the operations recorded at the Rawul Pindee Dispensary.

With respect to the operation Mr. Lyons says, "the lateral operation only is performed at the dispensary. The knife used is a large scalpel, of the form and size used by Sir W. Fergusson I think; no other cutting instrument is used. There have been four operators at the dispensary here during my time, *viz.*, Dr. Allen of the 2nd Goorkha Regiment who operates occasionally, two Sub-Assistant Surgeons and myself: and the name of the operators in each case has not been recorded, so that I am sorry I cannot give you the results of my own operations. I make a small incision, which I dilate with the finger or enlarge with the knife according to the size of the stone. The outer wound I make is about the length of an inch or $1\frac{1}{2}$ inch at the very most. I object to the

large incision that I have seen some operators make; I do not think a large incision necessary. I begin with a small incision which I enlarge subsequently with the knife, if the size of the stone should require it, and this does not often occur. Dilatation with the finger generally suffices.

"2. An incision just large enough to give egress to a calculus can surely allow the urine to escape, and a small incision is generally sufficient for the former purpose. I have not seen any instance of extravasation of urine.

"3. I never use a tube or a piece of lint, but let the wound alone. The urine finds its own way out without help. With reference to the value of small incisions and non-interference with the wound, I might refer you to case 92, which the operator, Dr. Banerjee, the Sub-Assistant Surgeon, reports to have healed by primary adhesion!! I enclose his note on the subject of the number of days the patient was unavoidably detained in hospital after the operation." Dr. Banerjee writes, "case 92 was discharged on the 14th not the 16th. He was cured on the day of operation, but I kept him in hospital for your inspection, and as your next visit was four or five days later, the delay in giving him his discharge was unavoidable. Moreover, he had to give information to his friends at home to come and take him away (as I did not allow him to walk about, and he was obliged to go in an *ekka*), and this caused a further delay of two or three days, so that it is not from the number of days he was in hospital after operation, but from the history of his recovery, that one is to judge of the time he took to get well."

4. Invariably gives chloroform, and never saw death result from it.

"5. I have been lately supplied with lithotritry instruments. The operations, two in number, attempted by Dr. Allen and myself, failed; once from inability to seize the stone, and once because the stone was too hard, and would not break under the lithotrite. I must confess to want of practice with the lithotrite. I do not think that the operation will be acceptable to the class of natives who resort to the dispensary, for with them time and a speedy cure are great desiderata. Besides, lithotomy has been so long known to them favourably that they naturally prefer it."

With respect to the composition of the calculi, Mr. Lyons says—"I have lately examined a collection of calculi cut out at the dispensary, and find them to consist only of two kinds, *viz.*, bone calculus (consisting of earthy phosphates and animal matter,) and oxalate of lime, pure, or combined with earthy phosphates. No lithic acid, triple phosphates, &c."

Respecting Dr. Murray's operation, Mr. Lyons says,—“I had the privilege of seeing Dr. Murray operate at the dispensary. The case is No. 91. The result was successful. I like Dr. Murray's operation, but think the large incision he makes after entering the bladder not necessary.”

Three cases of stone in the female are entered in Mr. Lyon's return; they were all cured.

No hæmorrhage appears to have been met with.

Surgeon H. F. Williams, 15th Regiment, N. I., and Civil Surgeon, sends from Ferozepore a return of 19 cases from the dispensary for the last year. Dr. Williams uses “a common medium-sized scalpel for the external incision, which I prefer making at once very deep, so as to hit the groove

in the staff—the largest size possible—almost immediately, opening the urethra well back, thus avoiding the artery; then running on the narrow bladed, straight, probe-pointed knife into the bladder.” Dr. Williams divides the prostate “sufficiently to admit the point of the finger with very little dilatation; ascertaining as much as possible the size of the stone by the point of the finger, and if a large one, enlarging the opening of the prostate downwards, and slightly outwards in withdrawing the knife.”

3. No tube is used; only a little lint, wetted, is placed over the wound; afterwards poppy-head fomentations are applied.

4. Gives chloroform as a rule, and has never seen ill-effects from it.

5. No experience of lithofrity.

Dr. Williams says—“ Dr. Murray was recently here, and operated on two cases, an old man and a child; and I have since adopted his method, and extracted from a man over 70, two very dense uric acid calculi weighing 3ii., 3ii., gr. xvii, of nearly equal size and weight. He did very well for six days, when he was attacked with pneumonia, and having disease of the lung of old standing, he suddenly died.”

One case of stone in the female is entered in this return—cured. No hæmorrhage is reported in these cases.

Mr. Mitsuish, Civil Surgeon at Jhung, sends twenty-nine cases from the dispensary for the last 3½ years. There is besides one female case—cured.

No hæmorrhage reported in any case.

Dr. Courtney forwards, in addition to the series of his own cases, a return of 210 male lithotomies from the Dera Ismail Khan Dispensary. These cases have spread over the last twelve years, and though not perfectly reported are to a great extent valuable.

Diarrhoea and dysentery carried off eleven of these patients; peritonitis was fatal to three; sloughing phagedœna to one. There were five cases in females; four successful, one fatal from peritonitis.

Hæmorrhage occurred in two cases only.

My friend, Assistant Surgeon R. S. Bateson, Civil Surgeon, Umballa, sends a return of 26 cases operated on at his dispensary during 1864 and 65. Mr. Bateson always performs the lateral operation with a "long, narrow bladed, straight knife; does not make a free internal opening at all, but dilates with the finger."

3. He adds—"I never use a tube after the operation but always syringe out the bladder with luke-warm or warm water, according to season of year; introduce no oiled silk or lint; tie knees together from the first. Cold water for first two hours; after no cold water, nothing but a piece of lint."

4. Always gives chloroform, and never saw ill-effects from it.

5. No lithotritry mentioned.

Mr. Bateson says—"with the exception of the one Hukeem's case which is in this return, I now never have a fatal case, but that I can account for it by some unavoidable slip in the operation. One adult died with stone in his bladder, the viscus being adherent to it. I couldn't extract,

and I could not break it; but a fatal case is quite a rarity with us now." With reference to his return Mr. Bateson says, "Two were cases that had been operated on by Hukeems, had stones in the bladder still, and fistulous sores, and were much exhausted and thin, and I operated with little hope. One died and one recovered."

Mr. Bateson has seen Dr. Murray operate once—case doing well.

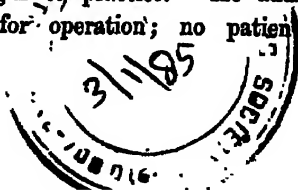
No hæmorrhage noted.

From my friend, Assistant Surgeon C. Kilkelly, Civil Surgeon, Allyghur, I have a return of 86 cases, on the greater number of which he himself operated. He says he prefers the lateral operation with the ordinary lithotomy scalpel; 'when the calculi were very large, I removed them by, cutting through both sides of the prostate. I dilate with my finger.'

3. He does not use a tube unless special circumstances require it, simply applies a piece of lint over the wound.

4. Always gives chloroform, never saw ill-effects from it. Has given chloroform altogether in hundreds of cases, and never saw any harm ensue except in one case, when the pulse sank till it was nearly imperceptible. The patient rallied however. The conclusions Dr. Kilkelly has drawn from his experience are—1st, that it is very difficult to kill an ordinary patient by lithotomy; I mean a patient in fair health. 2nd, that teachers of Surgery at home do not content themselves with pointing out possible dangers, but magnify them to such an extent that their pupils are made nervous to a degree when they begin to practice." He adds—"I have never selected cases for operation; no patient applying at the

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dispensary with stone has ever been sent away without being operated upon, since I came to Allyghur."

5. No lithotritry mentioned.

No hæmorrhage noticed.

Surgeon-Major H. N. Elton forwards a return of 84 cases from the Sealkote Dispensary; of these about two-thirds were his own cases. He says—"The lateral operation has been the rule with rare exceptions; and the simple scalpel has been preferred,—not sharp-pointed, but with a broad extremity, rounded off. I always dilate with the finger in preference to very free internal incisions.

"3. A tube is generally used after the operation, with lint; and chloroform is used as a rule at the operation. I have never seen any serious result from its use. The average of mortality of my own operations is 8 per cent."

5. No lithotritry mentioned.

One case in a female—cured.

No hæmorrhage noticed.

Sub-Assistant Surgeon Khether Chunder Nundy, of Goor-gaon, sends a most interesting return of 143 cases which have occurred in his own practice during the last six years; and besides these, 16 of his cases are embodied in the return from Jhung. He speaks with great authority on the subject of lithotomy, and I cannot do better than quote his own words:—

"Within the last six years I have performed upwards (160) one hundred and sixty lithotomy operations; and I must have done many more in my six or seven years' practice preceding the above period, but of this I have no note with me.

"1. I prefer the common lateral operation, but never carry my incision below the level of the anus; the external incision is seldom more than two inches long. By not carrying the incision below the anus, you cannot by any possibility wound the rectum, which accident, however, is not very uncommon, but unfortunately many surgeons don't bring this to the notice of the public. When the stone is a large one and a large external incision is to be made, I commence it a little above the point as recommended by Professors Miller and Fergusson. By this simple lateral incision, I have extracted stones weighing as much as *seven* ounces. I use the common scalpel almost invariably, except in cases where the perineum is very deep, when I take one with a long handle.

"2. Before, I used to dilate with my finger, but since the last two or three years I *cut freely*, and with the best result.

"3. Before, I used to put a tube or a female catheter into the wound for the flow of urine for 24 or 48 hours, according to the age of the patients; but since the last three or four years I have given it up almost entirely. I now use it only in cases of severe handling and laceration. By cutting freely and discontinuing the tube, the wound heals very rapidly, and the flow of urine by the natural passage is seldom retarded beyond three or four days. I do not put anything into the wound which sometimes heals by the first intention, and the urine comes by the natural passage from the first day of the operation. Since I discontinued the tube, a single case of infiltration of urine has not happened.

"4. I use chloroform *uniformly*, and never had a fatal accident from it. In two cases however, there were ill-effects subsequently, which I attribute to chloroform. In the first, case (a boy *æt.* 4 years) after the operation, the patient was

very heavy and comatose, and died 24 hours after without any other apparent cause. This was a fine, healthy looking child. Similar effects followed on another child of about the same age. In this case the chloroform was given for some other surgical operation. In the second case (a man aged 30 years) there were fits of convulsions at intervals after the operations, for two or three days.

"Mortality.—In 161 operations, there were 19 deaths, or 11·7 per cent. on the whole number. The mortality varied, however, at different periods and under different modes of procedure.

"From 11th March, 1860, to 1st March, 1862, a space of about two years, 58 operations were performed, and among these there were nine deaths, or 15½ per cent. In the year 1863, out of forty-three operations there were seven deaths, or about 16 per cent. So you see during both these periods, the mortality was about the same. I was then in the habit of using the tube or a female catheter after the operation, and instead of cutting freely, I was more in the habit of dilating with my finger the internal wound. I don't recollect the precise time when I dropped the use of a tube or female catheter. From the beginning of 1864 up to the present time, out of sixty-one operations there were only four deaths, or only 6½ per cent.; the difference being very great from 16 to 6½ per cent. This favourable result must be attributed, to a certain extent, to my long experience, and not entirely to my having given up the use of a tube after the operation, and the practising of dilating with my finger. In cases where no complication arises, stones weighing up to two or three ounces are extracted without the least difficulty, and within a minute or two."

5. No lithotritry mentioned.

Females—5: 2 recoveries; 3 deaths from peritonitis. No hæmorrhage noted.

From my friend, Surgeon De Renzy, Civil Surgeon of Mooltan, I have a return of 352 cases, being the number of male operations performed at the dispensary between April, 1857, and December, 1865. Of these operations Sub-Assistant Surgeon Ram Lall Ghose has performed probably about 100. The lateral operation is that preferred, and no tube is used. The incisions are made freely.

4. Chloroform is always given.

5. No lithotrity has been performed.

Of female operations there have been 23 during the period which the return embraces; of those 21 recovered, and 2 died. Hæmorrhage does not appear to occur often.

The stones are generally of a large size; above the average weight, I should say, from the inspection I have had of a number of them. It is a note-worthy fact that *scurvy* prevails much among the natives of Mooltan, nearly every man, whether Mussulman or Hindoo, showing it by his gums. Is there any connection between the prevalence of stone and of scurvy? Do they depend in any degree on the same causes; and are those causes to be found, as is so frequently asserted, in the water drunk by the people?

My friend, Assistant Surgeon Lackersteen, Civil Surgeon, Jullundur, forwards a series of 27 cases from that dispensary, being the number operated on during the last seven years. Dr. Lackersteen generally performs the lateral, but occasionally the median, operation. He always uses a scoop in the removal of the stone, and prefers this plan to introducing forceps,

indeed he says—"I never use forceps." He makes a large incision.

"3. Lint steeped in oil is introduced into the wound, and a proper bandage applied; nothing more is done."

4. Chloroform is given; and it is noticeable that case 25, a Hindoo seven years of age, "died under the influence of chloroform."

5. No lithotrity mentioned. No hæmorrhage noted. Dr. Lackersteen adds that he has had great success in the *medical* treatment of stone, employing measures to dissolve it out. This is a method not often, I believe, tried in India.

From Civil Assistant Surgeon P. A. Minas, now at Hissar, but formerly of Sirsa, I have a most complete return of 24 cases operated on by himself. He says—"I always, except in two cases (Nos. 10 and 12), performed the lateral operation, and used the ordinary scalpel. I cut freely the integuments of the perineum, and prefer dilating the prostate gland with the tip of my left index-finger.

"4. Chloroform, as a rule, is given in every case, and I never saw any ill-effects result therefrom. All the 24 cases were operated on by me, and three deaths occurred."

5. No lithotrity noticed.

Hæmorrhage occurred in case 24, but "hot turpentine-injection succeeded in stopping it."

In case 7 Mr. Minas says—"The stone was of an extraordinary large size; resembled that of a foetal hand. First lateral, then the bilateral operation was performed without success. Death occurred on the fourth day. On opening the

body, the calculus could not be extracted until the symphysis pubis was sawn through. It was lost during the late mutiny, but a pencil sketch of the exact size was forwarded with the Half-yearly Report, and may be found in the Principal Inspector-General's office, Calcutta." "I have written to ask for this sketch, or a copy of it, but the reply was that it cannot be found in the office in Calcutta, a circumstance much to be regretted.

Civil Assistant Surgeon I. R. Deane sends a series of 30 cases from the Bunnoo Dispensary. He says—"I use either an ordinary scalpel, or one whose point has been rounded a little; the operation being completed with the same instrument. I cut freely into the groove of the staff, carefully divide the membranous part of the urethra, and then very cautiously make the section of the prostate, *never* cutting through the 'whole extent of the left lateral lobe' as books teach us to do. Here, I feel, is where the *secret* of the operation rests. The staff should be firmly hooked up under the pubes, *not* pressed downward as it used to be long ago; and the knife should not be 'run into the bladder' after the knife strikes the groove. By holding the staff well raised, the base of the prostate is not endangered; and by cautiously and slowly notching the lateral lobe, the incision is kept within a safe limit. I always perform the lateral incision, and have no experience of any other mode of operation.

"3. I invariably use a tube after the operation, but it is removed after six hours, which I believe ensures safety from infiltration; a *longer* retention of the tube is unnecessary, and is, doubtless, productive of irritation.

"4. I always administer chloroform. It does often cause ill-effects, but by watchfulness, no fatal result has occurred

in my practice." "I have done perhaps 25, or more lithotomy cases, with one fatal result, and this was the first case. And I may add that this degree of success is materially owing to watchful 'after-treatment,' which perhaps does not generally receive sufficient attention, according to Ferguson's dictum."

5. Mr. Deane makes no mention of lithotrity.

No hæmorrhage was met with in his cases.

Of women there were four who presented themselves with stone,—all of whom were cured.

From Assistant Surgeon Isaac Newton, I have a most interesting series of 48 cases, operated on by him at Kurnaul during the last four years.

He says—"In these cases the mortality is higher than it otherwise would have been, had I picked my cases or excluded those I did not consider hopeful; in fact, in one or two, I simply operated to relieve the distressing symptoms, and in one case—No. 15—I was rewarded by a marvellous recovery.

"Out of 48 operations I had eight deaths, or 16.66 per cent., or one death in six. I now generally prefer the lateral operation. I first use an ordinary scalpel and cut straight down to the staff, make a small incision into the bladder, over the groove, and then take the probe-pointed bistoury and push it along the groove, straight into the bladder, cutting rather freely; I then introduce my finger and withdraw the staff, then take a straight staff as a director, and carry it along my finger until it touches the calculus; withdraw my finger and pass the forceps along the staff until it comes in contact with the calculus, then open the

blades and seize it. After extracting the stone, I invariably introduce a piece of well-oiled lint into the incision, which prevents any gluing together of the parts. I dilate very little, indeed, with the finger and then only in children, when the incision must necessarily be small, or when the stone is unusually large.

“3. I use the tube and plug only when bleeding is inordinate. I have mentioned it in the form in each case I used it.

“4. I have invariably used chloroform in every case of lithotomy performed at Kurnaul, and have never known any ill-effects from its use more than spasmodic straining or forcing down, which was a little troublesome in some children.

“I consider there are advantages in the median operation, such as being easier to perform and less dangerous, I would only do it when the calculus was small.

“In case No. 8, I made a blunder. The parts were very small and the incision in the bladder contracted and closed; the staff slipped through the incision into the cavity between the rectum and bladder, and I imagined at the time I was feeling in the bladder; I could not find any calculus, so after some little time, I put him to bed and treated him in the usual way, and I was astonished to find he got well without a bad symptom. I never saw the calculus, though I imagine it escaped with the urine, as he lost all symptoms of vesical calculus afterwards. In cases No. 31 and 32, I performed, as far as I understood from Dr. Brown, Deputy Inspector-General, to be Dr. Murray's operation, but I don't feel competent to give an opinion on so small an experience.

“5. I have not performed lithotrity for want of instruments.”

In case 15 above alluded to, the stone weighed ozs. 2—2—10, and its circumference was five inches and four inches. The patient was sixty years of age, and “wasted and emaciated, and so weak that I had little hope of recovery. He left hospital comparatively stout and well.” Cases 31 and 32, in which the operation was performed on Dr. Murray’s plan, both recovered.

Of the fatal cases it appears, that in case 3, the bladder was greatly diseased; in case 10, the patient was old, and there was much hæmorrhage; in case 26, erysipelas and sloughing proved fatal; in case 29, the patient was very weak, and the stone was adherent to the bladder; in case 34, the kidneys and bladder were extensively diseased, and the bowels in the neighbourhood of the bladder inflamed; in case 27, enteritis set in. In case 17, splenitis and diarrhoea proved fatal; in case 41, acute phthisis carried off the patient. The patient, in case 47, had a greatly enlarged prostate from which a slough separated. His friends took him away before the wound was healed.

In five cases in which there was hæmorrhage, plugging was used.

From my friend, Assistant Surgeon John Ince, 2nd Punjab Cavalry, I have valuable returns of 263 cases operated on at the Dera Ghazee Khan Dispensary, during the last thirteen years, and 80 cases at the Rajanpore Dispensary, during the last six and a half years. Dr. Ince says—

“1. I use the ordinary scalpel.

“2. Make very small incisions; dilate by finger, or if necessary, enlarge the opening by further incision.

"3. After the operation I use no tube, plug, or any other appliance, but have the wound open, and do not even apply any dressing of any kind.

"4. I always give chloroform, and have seen no bad effects from it.

"5. Have had no experience of Dr. Murray's operation, nor of lithotrity, which however I would never undertake, as I consider lithotomy, *cæteris paribus*, the safer and more effectual operation.

"My total number of operations has been only about thirty (30); I have lost only one as yet, so far as I am able to say. Latterly I have not dissected down to the bladder, but with one carefully directed thrust of the scalpel I have gone at once into the bladder, enlarging the external opening as I withdrew the knife. This is very expeditious, and with care is safe, and good practice I think. The openings are made very small, and afterwards enlarged if necessary. I have performed seven (7) cases of this kind, and all successfully." Females at Dera Ghazee Khan and Rajanpore—36, of whom 32 were cured, 2 died, and 2 were doubtful. No hæmorrhage noted.

I have received a return of 109 cases occurring in his own practice in the Punjab, from Assistant Surgeon J. Wilson Johnston, Civil Surgeon of Loodiana, which though not perfect, is useful in many ways. Dr. Johnston forwarded his calculi to Professor Longmore at Netley for analysis, and kindly intended to place the report at my disposal, but it has unfortunately not arrived yet. Dr. Johnston has kept a record of the size *by measurement*, as well as by *weight*, of his calculi, but I must be content to give simply the latter in

my Tables. It may be well to mention however, that the largest of his series measured four inches in length and seven inches in circumference.

In reply to the queries as to his mode of operating, &c., Dr. Johnston states—

“ 1. I have *tried* various operations, but prefer the use of the ordinary curved staff and a plain ordinary scalpel. Nearly all my operations have been so performed. The straight staff, lithotomy-knife, and bistoury I have used, but I feel certain one needs nothing but a plain staff and an ordinary scalpel for lithotomy. With an ordinary staff, made upon the folding principle of the male or female catheter combined, and a shutting scalpel, one is fully armed; and this, with a small phial of chloroform, occupies but little space. I have thus, in the district, cut many a one who would not otherwise leave his home, leaving a dresser or vaccinator (during the hot season) to look after him. They generally get on very well.

“ My method of operating is simply, cut at once down upon the staff, elevate the handle of the scalpel and carry knife and scalpel into bladder; withdraw scalpel guarded by the finger, re-enter it (and judge of the size of wound necessary to be made, both internal and external), cut outwards, dividing prostate and enlarging the external wound I have in practice found this easy and successful. I think in general, books give us a line *too* far from the perineal raphé. For children a small scalpel is used of course.

“ I have on more than one occasion, in a perineum of a child of little depth, with one cut taken the groove, and without withdrawing the scalpel, entered the bladder and

cut out, and found the stone in the artificial passage on passing the finger.

“ It is of the greatest importance to insist upon a rectal diagnosis.

“ 2. If a small stone, I don't dilate; if large, enter one or two fingers and describe a circle.

“ 3. No urine tube; glaze wound with glycerine.

“ This is a most excellent application, and, mixing freely with water of any proportion, can be made the medium of any local medicated application during the entire course of treatment. Immediately after the operation, stuff a tampon of cotton, not *saturated* but coated with glycerine, into the wound. It will soon glaze, and the urine pass blandly. Coat the external wound in like manner.

“ 4. I invariably use chloroform, unless in the cases of dilatation in the female. I have used it in many hundreds of cases, including operations and confinements, with only *one* fatal result, a case of excision of shoulder-joint in necrosis.

“ 5. Only attempted lithotrity in one case, a *female*, successful. Dilated with Weiss' instrument; stone too large; as I object to *cutting females* reduced its size, and extracted.

“ Never attempted Dr. Murray's operation, although (unknown to me), my method of operating approximates it.” This is certainly true, and the operation seems to be most successful in Dr. Johnston's hands.

The suggestion about the use of glycerine is well-worthy of attention, and Dr. Johnston has great faith in the application. He says, “invariably after the operation I inject

the bladder with luke-warm water; glycerine in the proportion of about 1th added, is advantageous."

Several curious cases are also mentioned.

"One very peculiar case I have not added, which was, so far as I could judge, cystic oxide. No less than thirteen polished pebbles were extracted, the smallest of which were lost somehow or other; the rest have been sent to Netley. They could be made distinctly to *rattle*, when one finger was *in ano* and a staff in the bladder.

"After cutting one case I found a tumour, or rather a polypus, which was over three ounces' weight. It was easily removed by torsion, and made a good recovery.

"I had one nasty case of recto-vesical fistula, the remains of a hakeem's operation, ultimately cured by a course of medicated bougies."

Dr. Johnston lays some stress on medical treatment and says—"All patients when admitted were, for some days, carefully prepared for the operation; and, judging from microscopic examination of urinary deposit, the calculus, if likely to be jagged or rough, attacked by suitable remedies: The local relief dispelled systemic irritation. I have seen a mulberry calculus apparently toned down in four days. Revalenta composed of *bajra* and *urrhur dhal*, made into a porridge with milk, is the best diet."

Eight women were treated; all cured by dilatation. Dr. Johnston adds—"Although I have written much longer than I anticipated, I before concluding would invite attention to the *females*.

"I strongly objected to cutting females; so do natives generally. I have invariably succeeded in dilating, and

generally the women left the hospital the *same day*. To illustrate this I may state,—last year (Loodiana somehow or other being famed for no kind of operation) a native consulted me about his wife; he objected to my seeing her, but was determined to obtain relief. His description left no doubt in my mind as to what was the matter; ultimately I undertook to extract a calculus without seeing or touching her, and without drawing a drop of blood. She was placed behind a *purdah*, or a table; directions given for introducing a sound; this done, it was placed in my hand. I soon detected a calculus of no great dimensions. Weiss's dilator closed was now introduced as before; grasping it I cautiously dilated and passed a small-sized forceps, and this concluded the affair successfully."

No hæmorrhage noticed.

In presence of the foregoing ample experiences, I feel diffident in alluding to my own cases, which, as far as they are recorded, amount to only 17. They were performed in different parts of India, and the lateral operation of Cheselden was the one adopted. The instruments—an ordinary scalpel, a staff with a lateral groove, and forceps.

2. I make a free external, and limited internal, incision, regulating the latter, however, in some measure by the supposed size of the stone; then dilate with the finger, which, on account of their luxury of fibre, may be an easier process with the natives of India than with Europeans. The chief difficulty I have met with has been in extracting a very large or an oddly-shaped stone; in one instance the stone was church-bell shaped, and gave considerable trouble. A badly prolapsed anus too I have found very annoying.

3. At first I used to introduce a piece of lint into the wound, and retain it for twelve hours or so ; now I omit this, as it only irritates and is quite useless, for the urine finds an easy exit from the bladder. I have never had hæmorrhage or infiltration of urine follow the operation, and have never had occasion to use a tube or female catheter. It is important to support the patient with nourishing food, and often even to give stimulants and tonics soon after the operation, especially to weakly natives.

4. I have invariably given chloroform, and with the best effect.

5. I have never performed lithotrixy, nor have I even seen it performed in India.

I may add that I never picked my cases, and as will be seen by Table I., I operated on several which were unpromising in consequence of the patients being weakly subjects.

All the cases recovered.

Surgeon Major C. M. Smith, for many years past Civil Surgeon of Lahore, has kindly favoured me with some remarks which, as the result of his great experience, are so valuable that I give them entire. After regretting that he is unable to furnish the statistics of his cases, in consequence of not being in possession of his case-books, Dr. Smith says—
“ I have however, during my Indian service, had a very fair share of lithotomy, and must have operated at least 200 times. I always perform the usual lateral operation, using a common scalpel, taking care, however, that it is straight in the blade.

“ 2. I only just notch the prostate, and dilate it with the finger and so enter the bladder. I have never lost a child ; and the mortality has not been more than $2\frac{1}{2}$ per cent.

" 3. When I first commenced operating (in 1845) I always inserted a tube after operation, but of late years I have abandoned this as not required.

" 4. I have used chloroform in every case, and never saw any ill-effects from it.

" 5. I have performed lithotrity a few times, but found the old operation of lithotomy so much more satisfactory, that unless there was some very special reason, I should always prefer the cutting operation. I have not seen Dr. Murray's operation; I believe that it has always been very successful in his hands, but from the description I have had of it, I do not see what advantages it possesses over the old mode. I have operated twice on Europeans in this country; both successful. The last case was a few weeks ago; a very fat man 50 years of age, with a very deep perineum. Two calculi were extracted. The wound was perfectly healed on the seventh day, and the man sitting up and about in a fortnight."

Assistant Surgeon W. B. Switzer forwards a series of cases from Cawnpore, operated on principally before he became Civil Surgeon there; but so imperfect is the return, that I have been reluctantly obliged to omit it. As however Mr. Switzer has had much experience in lithotomy, I give his remarks in his own words:—

" As regards my own experience you are quite welcome to it. During the last eight years, I have performed the lateral operation over fifty times. It is a matter of lasting regret to me that the books, in which all the particulars of these cases were written down, were lost in 1863 when I went home on sick furlough. However, I can tell you some of the

particulars. The youngest I ever cut was my own son when eleven months old; he was dying from irritative fever, and it saved his life. He is a sturdy boy of five years old now. The stone was the size of a garden pea, and was removed by a dressing forceps. I have operated from that age upwards to old men of 60 or 70, but I never saw stone in the female. I never performed any operation but the lateral one of Cheselden, which on one occasion I converted into the bilateral, to remove a stone too large for the single cut; it was simply performing a second lateral on the right side, and joining the incisions in the raphé, making a large flap in the perineum, triangular base at anus, apex pointing to scrotum. The knife I use is a common scalpel, the smallest blade I can get and very round at the point; my staff is always grooved on the convexity, not laterally.

"2. I always make a very free external incision, from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches, and that forms the base of a triangle, whose apex is at the point in the membranous portion of the urethra where my knife strikes the staff. The point being in the groove, I completely lateralize the blade, and push steadily on into the bladder. There can be no error if this is done, and no good surgeon will ever let the point of his knife out of the groove, until the gush of urine or the distance tells him his cutting is done. I never cut after I know I have an opening into the bladder, but freely dilate with the left fore-finger, and when it touches the stone I remove the staff. I have never seen any amount of dilatation made in removing a moderate-sized stone through such a wound, followed by evil consequences. One caution is necessary, however, in a young child; a large fore-finger, in endeavouring to enter the bladder, might push it away before it, for the ligaments then, like the age, are tender.

"4. I always give chloroform, and have never had any bad effects. Never heard of Dr. Murray's operation. There could not, by any possibility, be invented a more easy or safe section for vesical calculus, than the lateral.

"5. I have never performed lithotrity. . .

"I cannot positively say, but to the best of my belief I have lost nine cases out of about 56; three of these, however, were owing to my very foolishly keeping five cases to operate on one morning. Erysipelatous inflammation seized them, and three died from it in 36 hours."

It is curious that Mr. Switzer should have had occasion to operate on his own son, but both his experience and Dr. Smith's go to show that lithotomy is a successful operation on Europeans in this country. It is also remarkable that he should not have met with stone in the female.

It may be well to epitomise and briefly to discuss *seriatim* the foregoing remarks, and I therefore proceed to do so in as concise a manner as possible.

1. As to the kind of operation, and the sort of instruments used in its performance.

It appears that of the above-mentioned twenty surgeons, three only performed the median operation, and that but very occasionally, the lateral being the mode of lithotomy generally preferred.

One case, Mr. Allen's, of supra-pubic extraction occurred in a child, and was successful. Dr. Dickson also performed this operation on a woman, but unsuccessfully. In regard to this operation it may be noted that, during an interesting discussion at the Medical and Chirurgical Society on February

73th last, Mr. H. Thompson is reported to have said with reference to calculi of large size, "altogether it was well worthy of consideration, whether such stones should not be removed by the high or supra-pubic, rather than by the lateral operation. He inclined to the belief that the former was preferable in these cases." (*Vide the Lancet of March 3rd, 1866.*)

Dr. Murray's operation seems to have had a very limited trial by others, though at Agra, doubtless, it has been extensively practised; of the nine cases here reported, four were cured, three died (though not from the operation), and two were uncertain in their results.

The instruments used were generally of the simplest character. No blunt or cutting gorgets, nor any of the paraphernalia which used to be considered almost essential to success; but a common scalpel, sometimes rounded at the point, and with a straight back; occasionally a bistoury; a staff with a lateral or central groove, generally perhaps the former; a pair of forceps, and now and then a scoop; these were the means which, in skilful hands, have relieved the hundreds of cases comprised in this paper. I see that Dr. Fayrer prefers, as I do myself, a staff laterally grooved, but this is a point on which every surgeon must suit himself. Mr. Newton does not use his finger as a director to the forceps, but introduces a straight staff for that purpose. Mr. Allen proposes to use a hollow sound, on account of the difficulty sometimes felt in knowing whether a solid sound has entered the bladder.

2. Of the twenty surgeons, it seems that a large majority prefer dilatation to free division of the prostate; fifteen being advocates of the former, and five of the latter mode of procedure.

This is a point on which there will probably always be differences of opinion. We find, among later writers, Mr. Erichsen saying—"the incision into the prostate should be of very limited extent: on this point all surgeons, I believe, of the present day are agreed;" while Mr. Thompson is persuaded that "insufficient internal incisions are equally dangerous with those which are too free, and that the tendency of the present day is towards the former extreme;" and Sir William Fergusson, "in his lectures last year at the College of Surgeons, declares that "it may be said that at all times, in the history of lithotomy, there has been a great question as to freedom or limitation of the incisions." The best surgeons have advocated both, and true safety perhaps lies in this, as in so many other matters, neither with the one extreme nor with the other; for, as is well said by Mr. Thompson, "we must preserve the neck of the bladder equally from too deep an incision on the one hand, and from the mechanical injury necessitated by one which is too limited on the other." I believe I have seen greater ill-effects produced by too free cutting, than by slow and careful dilatation; but the practice of my ancestor, Mr. Martineau of Norwich, and of the great Cheseklen, is probably the safest, *viz.*, to enlarge the original incision sufficiently for the stone to pass, using the blades of the forceps as a guide to the knife.

The proper manipulation of the forceps has always appeared to me to be most difficult, and at the same time perhaps the most important part of the operation; undoubtedly it is so with stones of more than a certain size, say over two ounces and also in cases where they are of a peculiar shape. The fault of operators often is that they are in too great a hurry, and that in desiring to ensure a rapid extraction, they forget to take full advantage of the dilatability

of the neck of the bladder, and are apt to exert a degree of force most hurtful to the delicate structures connected with it.

3. With regard to the introduction of a tube or female catheter after the operation, it appears that four of the twenty surgeons pursue this plan, though not constantly; while one, Dr. Lackersteen, is in the habit of introducing a piece of oiled lint into the wound for a few hours, and Dr. Johnston uses cotton coated with glycerine for the same purpose. The great majority of operators leave the wound alone, and I see that Dr. Fayer follows this practice, except of course in cases of hæmorrhage. Mr. Kiernander applies from 8 to 24 leeches about four hours after the operation.

4. Every one of the twenty surgeons is in the habit of giving chloroform, and in the large experience here detailed, but three cases suffered at all from it.

5. The information regarding lithotritry is but small, few surgeons, as has already been seen, considering it an operation suited to the natives of India. Dr. Smith, of Lahore, and Mr. Lyons have tried it a few times, but both prefer lithotomy. I find that at the Lahore Medical College Hospital, the Annual Reports of which for 1861, 1862, and 1864 I have been favoured with by Dr. Brown, the Officiating Principal, there occurred during these three years fifteen cases of lithotritry, of which eight were cured, one died, and six were uncertain in their result; the large number of the latter being due principally to the patients' going away of their own accord before the cure was completed. The Principal, Surgeon Scriven, advocates lithotritry in old men and in women, and remarks—"I consider it (lithotritry) much preferable to lithotomy for women, for, though the latter operation can scarcely be said to be dangerous to life in the female, it is

very often unavoidably followed by incontinence of urine which renders the patient's life permanently miserable." Mr. Scriven adds—"Government have not yet provided the Department with the best lithotripsy instruments. No expense, I think, ought to be spared in procuring such instruments of the best possible quality. In one case of mine during the past year, the lithotrite bent, while in the bladder, in crushing a very hard stone.

"This has been reported to the Principal Medical Storekeeper. I do not think such an accident ever occurs with the best instruments made by Weiss or Coxeter."

It may be concluded that lithotripsy has not as yet had a fair trial in India, but, as I have already said, it seems also improbable that it will ever supplant lithotomy, except possibly in cases of old men.

To turn now to the Tables whose details are more or less perfectly filled in, it will be seen from Table I. that—

1. Twenty-two *series of cases* are recorded, comprising 1,851 cases.

2. The average *age* at the time of operation in each series of cases, varied from 17 years to 34 years, 11 months.

3. The cases noted here were of course all *males*; but, in addition, 90 cases of operations in females were reported, of whom 79 were cured, nine died, and two remained uncertain. Mortality—1 in 9·77.

4. As to *caste*, as far as reported there were 1,160 Mussalmans to 551 Hindoos. It appears, therefore, that the Mussalmans predominated over the Hindoos in the full proportion of one to two; though in some districts, as Rohtuck,

Umballa, Allyghur, Jullundur, and Hissar, the contrary was the case. The reason for this, in the absence of full information as to the proportion of each race in the particular localities, cannot easily be discovered. Is it that both being equally subject to stone, one class comes forward more readily than another for operation; or does one race really suffer more frequently from this disease than the other?

5. *The average duration of disease* in each series of cases, varied from three years, eight months, to one year, eight months.

6. *The average mortality* in 1,718 cases, after deducting 133 doubtful cases from the total of 1,851, was 1 in 6·63. Mr. Coulson found it in 1,743 cases to be 1 in 6·93; Mr. H. Thompson in 1,827 cases to be 1 in 7·50.

There appears to be great variations, even in India, in the mortality; for while Dr. Fyrrer in Calcutta lately found it to be nearly 1 in 3, Dr. Smith at Lahore states that in his experience it has not exceeded $2\frac{1}{2}$ per cent., or 1 in 40. These may probably be set down as the two extremes.

With regard to the *causes* of the mortality after lithotomy, Sir William Fergusson says—"Two great objects have evidently been arrived at by all who have given attention to this operation, *viz.*, rapidity of execution and safety of result; and with due regard to perfection, there can, in my opinion, be little doubt that rapidity, even in these days of anæsthesia, is an advantage. But various opinions obtain as to the way in which this is to be secured, and it is perhaps a great danger that rapidity should be more in the mind of the operator than safety. * * * *. What man of acknowledged reputation can say which is the safest and, therefore,

the best manner of proceeding;—whether rapidity or slowness, free incision or limited, are the best? Few well-known men in modern days can boast of an experience such as that of Jacques, of Rau, or of Cheselden. Instead of the conjectural number of 5,000 of Jacques, let us take the 213 of Cheselden, which he chose to refer to as his public practice in this operation. Of that number he lost only 20; yet I have it from Sir Benjamin Brodie, as a tradition which he had imbibed, that in the latter years of Cheselden's practice, private as well as public, the results had been such as to cause him the greatest distress and mortification." It is not always easy, as Sir Wm. Fergusson says, to ascertain the causes of the successful issue or fatal result of lithotomy, in cases well selected and operations reasonably well performed. Every great lithotomist has probably had a run of unfortunate cases, at some time or other; and again, like Cheselden, or Mr. Martineau of Norwich, who lost but two patients in a series of 84, may have had a succession of exceptionally successful ones.

I have endeavoured to draw up a Table showing the immediate causes of death in the 259 fatal cases included in this paper, but the records are unfortunately so imperfect that much of the value of statistics is lost. The Table is marked No. IV.

Considering that the mortality is influenced to a great extent by the *age of the patient*, and the *weight*, or in other words the *size*, of the stone, I have framed Tables II. and III. which include respectively 1,585 and 744 cases.

From Table II., it appears that up to 40 years of age the operation is very successful, and that below 10 it is most markedly so; while above 40, death results in a steadily

increasing ratio. Dr. Smith says that he has never lost a child, while Mr. Scriven, also of Lahore, finds "the percentage of mortality of cases above 40, occurring from the time the hospital was established as a dispensary up to the end of 1861, to be just 50 per cent." At the same period of life at Guy's Hospital it was found to be 57 per cent.

I place here in juxtaposition the mortality as discovered by Mr. Coulson on analysing 2,972 cases, and that which I have found in 1,585 cases; they will be seen to approximate very closely:—

	Under 10 Years.	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80 to 90	90 to 100	100 to 110
Mr. Coulson's	1 in	1 in	1 in	1 in	1 in	1 in	1 in	1 in	...	...	...
2,972 Cases ...	13	9	6	5	4	3.65	3.23	2.71	...	...	...
My 1,585 Cases	1 in	1 in	1 in	1 in	1 in	1 in	1 in	1 in	1 in	1 in	1 in
...	13.88	8.14	8.23	5.95	4.11	3.43	3.31	2.70	1.33	1	3

The oldest cases were probably those marked 361 in the Mooltan, and 145 in the Dera Ghazee Khan, returns; the patients were 110 years of age.

The youngest case occurred in the Dera Ghazee Khan series, a child aged $1\frac{1}{4}$ year; but Dr. Switzer's son, not here noted, was but 11 months old.

It is needless to add that there is always considerable uncertainty about the ages of natives; still those given are doubtless a near approximation to the truth.

From Table III., it will be seen that the size of the stone has a marked influence on the result of the operation; and

in the column of remarks in Table I., this influence is several times noticed. I give here the mortality found by Mr. Crosse of Norwich in 703 cases, and that deduced from the 744 cases included in this paper :—

	Under 1 oz.	1 to 2 oz.	2 to 3 oz.	3 to 4 oz.	4 to 5 oz.	5 to 6 oz.	6 to 7 oz.	7 to 8 oz.	8 to 9 oz.	9 to 10 oz.	10 to 11 oz.
Mr. Crosse's	1 in	1 in	1 in	1 in	1 in	...	..	...	...	...	...
703 Cases ..	11.25	6.61	2.18	1.57	1.06	...	...	...	...	...	...
My 744 Cases	1 in	1 in	1 in	1 in	1 in	0 in	1 in	...	..	1 in	1 in
...	16.96	7.01	5.87	3.12	3	3	5	...	...	1	1

From this it would appear that large stones are more common in India than in England, and that the success of the operation in proportion to the size of the stone is also greater in India.

Besides the size, the *shape* of the stone has some influence on the result of the operation, but perhaps its *position* is a yet more important consideration; for, when it is *encysted*, for example, the difficulty met with in extraction is great on account of its being frequently adherent to the bladder, or, in some cases, embedded in its coats. Several cases of this kind are noticed by Mr. Sub-Assistant Surgeon Nundy and others, and Mr. Nundy has favoured me with some interesting remarks on this subject which are well worth a place here. He says :—

“The case No. 2 was a peculiar one. Just before the operation the stone was distinctly felt, but on cutting into the bladder no stone was found, and after searching for a reasonable time, the patient was removed from the operating table.

I was assisted in the operation by Dr. Currie. We had no chance of a second exploration, as the patient insisted to go to his home three or four days after. The wound soon closed, but the symptoms of stone were as before. A month or two after, the man presented himself before an Assistant Surgeon of some European regiment, who after examining him operated on him, but he met with a similar result. There was no doubt that this time the man was very severely handled, as he was a corpse before he could be barely removed from the operating table.

"I had another case of the above nature, but not included in this Table. The subject of this case was a boy, æt. four or five years. In this case I had operated twice unsuccessfully at the intervals of a few months, and on both these occasions I was assisted by Dr. Currie. At both times, however, the wound soon closed, and so the patient was not made worse. Subsequently the boy was cut by a native barber, or Jogee surgeon, and I am told he had got the stone out, but the boy died from peritonitis a day or two after."

In both these cases it is apparent, that the stones were almost wholly encysted, only a small part being felt exposed in the bladder, and whence the peculiar click was felt by the sound; but no sooner was the bladder cut into than by the contraction of its mucous coat, the stones became wholly covered, and therefore nowhere to be found.

In such cases it is prudent to leave the patients alone. As far as it has come within my observation, I have found such cases, where the stones are wholly or almost wholly encysted, if operated on to end fatally. Here is another case that happened in the practice of another doctor. In 1854 or 1855, a respectable Hindoo came to me with symptoms of stone,

and on examining, a large stone was clearly felt by the sound. He being a very nervous man, even the name of the operation frightened him. Two or three years after, this man again came to me and requested me to operate on him. He was emboldened to such a step by seeing many successful cases. At this time, however, the stone was not to be felt in the bladder by the sound, although I had examined him several times. As to the presence of a stone I had not a shadow of doubt, but I declined the operation, stating that even if the stone could be got out, it would be at the expense of his life. This man was subsequently examined by five or six other doctors, but with the same result. By examining through the rectum, a heavy weight was felt by the finger. At last the man was operated on by Dr.—, and he succeeded in getting out the stone, but the patient died a few days after.

Sometimes the stone is caught above the pubes, and cannot be discovered by the forceps. I have not met with such a case, but Mr. Nundy refers to it in the following terms:—"When the non-finding of the stone is owing to the above cause, it can be extracted by a very simple contrivance. Inject the bladder with tepid water by any common syringe, and when the viscus is full it is sure to fall to the bottom, and then it can be easily extracted. By this simple means I have succeeded perfectly in cases where the difficulty was owing to the above cause."

Occasionally *no stone* is to be found. This may occur in three ways—

1st.—There may have been a mistake in the diagnosis, and on cutting into the bladder, some roughness or calcareous

deposit on its walls may be all that can be discovered. I have seen a case of this kind, though it did not occur in my own practice.

2nd—The operator, usually an inexperienced one, enters, as he thinks, the bladder, but really fails to reach it, and, in groping about between it and the rectum, makes a sort of false cavity in which, of course, the stone is not. I have witnessed this on one occasion; the patient subsequently had his stone extracted and recovered well. Mr. Newton appears to have made a mistake of this kind in one of his cases, but it would seem to be a very rare occurrence in India.

3rd—A small stone sometimes escapes unperceived with the first gush of the urine, and when the operator expects to find it in the bladder, he is disappointed. I have not seen this, but Mr. Nundy says:—"In connection with this I might state another case (a boy, æt. 12 years), where after cutting into the bladder no stone was found, although he was examined two or three times after the operation. The wound was allowed to heal, and the patient on getting well was discharged. I kept this boy under observation for some months subsequently, and found him to be perfectly free from any symptoms of stone. In this case it is evident that the stone must have been a very small one, so it might have passed with the first gush of water, or with the blood." It may be observed that Mr. Newton had a case very similar to this.

The mortality is of course influenced, as is shown by Table IV., by many other circumstances, such as a diseased state of the bladder, which may be thickened, contracted, ulcerated, or have polypi attached to it; or a contracted pelvic outlet may produce such difficulty as to cause death, as occurred

in one of the Dera Ismail Khan cases; or enlarged prostate, diseased kidneys, &c., &c., may bring about a fatal result. Race, climate, and the condition of the patients' general health, have all great influence on the result of the operation; for while the healthy Punjahee or Jat, in his dry climate, presents the most favourable subject possible, the weakly inhabitant of Lower Bengal, in a damp atmosphere and surrounded by unfavourable hygienic conditions, is, as has been shown by Dr. Fayrer, most especially prone to death from toxæmic causes. It is noticeable that two-thirds of the fatal cases in the Allyghur series, took place during the great famine year, 1860-61, and were directly due to the privations endured by the people at that time.

Hæmorrhage appears to have had but little influence on the mortality, as it is noticed in only twelve cases out of the whole, and does not appear to have proved fatal in any instance.

Wound of the rectum too, a danger much spoken of in books, seems to have been a rare occurrence.

7. *The average number of days under treatment* after operation in the 22 series of cases, varied from 13 to 32 days.

8. *The nature of the operations* adopted has been already sufficiently described and discussed. Out of a recorded total of 1,088 cases, there were 1,061 Lateral, 18 Median, 1 Suprapubic, and 5 of Dr. Murray's operation. Dr. Johnston's have been included in the lateral, but really approximated more to Dr. Murray's.

9. *The average weight of the calculi* in the 18 series of cases here recorded was 7 drs., 42 grains.

The largest stone extracted during life weighed 11 oz., and occurred in the Sealkote series; death followed the operation on the sixth day in consequence of diffuse inflammation of the cellular tissue of the pelvis. Probably, Mr. Minas' case, No. 7, was the most enormous calculus met with in this series, but its weight has not been recorded. Many stones of 3 and 4 oz. and upwards, as will be seen by Table III., have been extracted successfully.

The smallest in this series weighed 3 grains.

10. As to the *composition of the calculi*, it appears that the 365 cases here recorded may be arranged as follows :—

Uric or Lithic Acid, pure or mixed.	Phosphatic.	Oxalic Acid, pure or mixed.	Organized.
225	104 .	35	1

One or two points remain to be noticed. The *number* of stones removed seldom seems to have been great; indeed the most extracted in any one case appears to have been 12, though frequently 2, 3, 4 and 5 were met with.

Many of the patients had been *operated on before*, some as many as three and four times; and these cases often recovered well. The cases were never *picked*; each surgeon did his utmost for his patients, and often consented to operate even though the sufferer might appear to be at his last gasp. Sometimes the patient recovered, even when his chance appeared the smallest possible.

In conclusion it is, I may say, matter of great regret that the records kept at some of the dispensaries are so

imperfect; for, were fuller details to be noted as to the causes of mortality, and also regarding the weight, composition, &c., of the calculi, a mass of information on this interesting disease would, in a few years, be available, such as probably no other country could produce.

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TABLE
SHOWING the Particulars of 1,851

Name of Operator or of Dispensary.	Number of Cases.	Average Age of Patients.	Sex.	Caste	Average Duration of Disease.	Average Mortality.	Average Number of days under Treat- ment after operation.
		Yrs. Mos.			Yrs. Mos.		
Asst. Surgeon S. C. Courtney	32	29 3	Male	Mussalmans, 23... Hindoes, 9 ...	1 11	1 in 8	19
Asst. Surgeon W. E. Allen.	29	21 3	Do.	Mussalmans, 23... Not recorded, 7...	3 7 (as noted in 13 cases)	1 in 7.25	16
Civil Asst. Surgeon } W. C. Kiermader }	28	32 9	Do.	Mussalmans, 26 ...	2 9	1 in 28	14
Civil Asst. Surgeon } W. F. Dickson }	25	20 2	Do.	Mussalmans, 4 ... Hindoes, 21 ...	2 3 (as noted in 9 cases)	1 in 12.50	20
Rohtuck Dispensary ...	29	30 0	Do.	Mussalmans, 6 ... Hindoes, 23 ...	Not noted.	1 in 14.50	22
Rawul Pindas Dispensary	153	30 11	Do.	Mussalmans, 97 ... Hindoes, 56 ...	2 11	1 in 9.36 (not includ- ing 23 case in which the patients were taken away, or absconded.)	19
Perospore Dispensary ...	19	30 5	Do.	Mussalmans, 18 ... Hindoo, 1 ...	2 5	1 in 4.33 (not, including 6 cases still un- der treatment.)	23

I.

Cases of Lithotomy.

Nature of Operation.	Average Weight of Calculi.	Composition of Calculi.	REMARKS.
	Oz. Dra. Grs.		
Lateral, 24 ... Median, 8 ...	1 0 1	Lithic Acid, 28 ... Oxal. Acid, 1 ... Trip. Phosph., 3 ...	In case 1, diarrhoea and low typhoid set in and proved fatal. In case 6, an extensive incision was required; the wound sloughed into rectum, but healed entirely. Cases 9 and 15 sank 2 days after operation. In case 23, much secondary hæmorrhage and swelling of large joints, coma, death. In case 29, wound healed almost by first intention. ; In cases 8 and 17, there were respectively 3 and 2 stones.
Lateral, 20 ... Median, 2 ... Supra-pubic, 1	0 6 37	Urate, 20 ... Do, with Phosphates, 3 ... Lithates, 1 ... Phosphates, 2 ... Not noted, 3 ...	Two deaths were from peritonitis two from asthenia. Case 7 had been operated on previously. In cases 5 & 14, there were 2 stones; in case 23, 3 stones (2 in prostate); in case 10 (fatal) 4 stones.
Lateral, 27 ... Median, 1 ...	0 7 53	Uric acid, 7 ... Phosphatic, 6 ... Mixed Uric Phosph. 6 ... Oxalate of Lime, 4 ... Urate of Am. with Uric Acid, 2 ... Urate of Ammonia, 1 ... Oxal. with Uric acid, 2 ...	Five of these cases had been operated on before generally by Joggies. Case 17 (cured) had undergone 4 operations in 11 years. Cases 15 & 24 had been cut twice before. In case 9, there were 6 stones; in case 28, 4 stones; in cases 7, 14, 16, & 23, there were 2 stones.
Lateral, 25 ...	0 3 41	Uric Acid, 24 ... Trip. Phosph., 1 ...	In case 13, two polypi were removed with the stone. Case 15 died of peritonitis. Case 16 was very ill before operation, and died of weakness. Case 18 died subsequently from the effects of enlarged prostate. Case 25 had a perineal stricture just above the sphincter ani, which transmitted urine; perfectly healed.
Not noted, probably Lateral...	0 7 33	Uric Acid, 17 ... Trip. Phosph., 9 ... Oxal. of Lime, 2 ... Not noted, 1 ...	11 cases by Dr. Taylor; 18 by Dr. Woolhouse.
Do.	1 3 11	Not noted.	Occasionally 3 calculi were found, and in one case, 5. Twice, small prostatic calculi were likewise removed.
Lateral, 16 ... Dr. Murray's, 3	0 6 35	Uric Acid, 3 ... Oxal. of Lime, 3 ... Phosph. of Lime, 1 ... (As far as noted.)	In one case of Dr. Murray's operation, death took place on the 6th day from pneumonia.

TABLE

SHOWING the Particulars of 1,851

Name of Operator or of Dispensary.	Number of Cases.	Average Age of Patients.	Sex.	Caste.	Average Duration of Disease.	Average Mortality.	Average Number of days under Treatment after operation.
		Yrs. Mos.			Yrs. Mos.		
Jhung Dispensary ..	29	27 5	Male.	Mussalmans, 23... Hindoes, 6 ...	3 7	1 in 9-68	14
Dera Ismail Khan Disp.	20	23 3	Do	Mussalmans, 18... Hindoes, 20 ...	Not noted.	1 in 6-12 (not including 7 doubtful cases in which the patients left the Dispensary prematurely.)	26
Umballa Dispensary ...	26	19 0	Do.	Mussalmans, 6 ... Hindoes, 18 ...	Do.	1 in 26	21
Allypore Dispensary ...	66	26 5	Do.	Mussalmans, 19 .. Hindoes, 67 ...	3 3	1 in 9-33 (excluding two doubtful cases.)	21

I.

Cases of Lithotomy.—(Continued.)

Nature of Operation.	Average Weight of Calculi.	Composition of Calculi	REMARKS.
Not noted, probably Lateral...	Oz. Drs. Gra. 1 3 3 (as noted in 11 cases.)	Not noted.	In several cases there were 2 calculi. 5 cases by Sub-Assistant Surgeon H. M. Tagore. 5 Do. by Mr. Kingawill. 18 Do. by Sub-Assistant Surgeon K. C. Sundy. 3 Do. by Mr. Mitni-h.
Do.	Not noted.	Do.	<p>Diarrhoea, dysentery, and peritonitis seem to have been very fatal after these operations. Several were very unfavourable cases, with diseased kidneys and albuminous urine.</p> <p>In case 17, a large hollow stone was removed.</p> <p>In case 135, "the stone was connected with an ulcer in the bladder, which was the probable cause of death."</p> <p>In case 208, the median operation was performed, and followed by rapid and complete recovery.</p> <p>Cases 212 & 213 were operated on by Dr. Murray, the former was "a dwarf with a very narrow pelvic outlet; some laceration occurred during extraction." The stone weighed 2 oz., 20 grs. Death took place on the fourth day after operation.</p> <p>Case 213 was an unhealthy child, who died of dysentery.</p>
Lateral, 28 ...	Do.	Do.	<p>2 of these cases had been operated on before by Hukrems, and had fistulous sores, bandages being thin and worn out.</p> <p>1 case did well, and 1 died.</p>
Lateral, 88 ...	0 8 59 (As noted in 30 cases.)	Phosphatic, 25 ... Lithic Acid, 11 ... Phosphates & Lithates, 8 ... Lithate of Ammonia, 3 ... Oxalate of Lime, 2 ... (as far as noted.)	<p>The deaths that took place in 1860-61 (8 in number, or two-thirds of the whole) "were due to the wretched state of health in which the patients were, in consequence of the privations they endured during the famine."</p> <p>In case 16 the circumference of the encolus measured 9 inches longitudinally and 7 transversely. It weighed 7 oz. 11 drs. Avordupois weight. The patient died.</p>

TABLE
SHOWING the Particulars of 1,851

Name of Operator or % of Dispensary.	Number of Cases.	Average Age of Patients.	Sex.	Caste.	Average Duration of Disease.	Average Mortality.	Average Number of days under Treat- ment after operation.
		Yrs Mos.			Yrs. Mos.		
Sealkota Dispensary ...	84	34 11	Male.	Mussalmans, 49 ... Hindoos, 35 ...	2 3	1 in 7-37 (excluding doubtful cases.)	23
Sub-Assistant Surgeon K.C. Nundy ...	143	30 9	Do.	Mussalmans, 86 ... Hindoos, 57 ...	Not noted.	1 in 9-86 (excluding doubtful cases.)	13
Mooltan Dispensary ...	335	31 9	Do.	Mussalmans, 255 Hindoos, 87 ...	Do.	1 in 6-63 (excluding doubtful cases.)	26
Jullundur Dispensary .	27	17 6	Do.	Mussalmans, 11... Hindoos, 16 ...	1 8	1 in 8-33 (excluding doubtful cases.)	26
Civil Asst. Surgeon P.A. Minas	24	30 2	Do.	Mussalmans, 4 ... Hindoos, 20 ...	2 10	1 in 8	33
Bannop Dispensary ...	39	21 8	Do.	Mussalmans, 39...	Not noted.	1 in 5-27	26

I.

Cases of Lithotomy. (Continued.)

Nature of Operation.	Average Weight of Calculi.	Composition of Calculi.	REMARKS.
	Oz. Drs. Grs.		
Lateral, 81 ...	1 0 59 (as noted in 57 cases.)	Phosphates, 7 ... Lithates, 6 ... Lithates & Phosphates, 3 ... (as far as noted)	In 5 cases, death resulted from diffuse inflammation of the cellular tissue of the pelvis or of the neck of bladder; in 1 case from asthenia and exhaustion; in 1 case from pyæmia; and in another from peritonitis. In case 30 the calculus weighed 11 oz.; the patient died. In one case 9, calculi were removed the patient recovered.
Lateral, 143 ...	1 1 15 (as noted in 86 cases.)	Lithic Acid, 30 ... Phosphates of Lime, 6 ... Oxalate of Lime, 2 ... Carb. of Lime, 1 ... Trip. Phosph., 1 ... Mixed, 1 ... Organized 1 ... (as far as noted.)	In several cases there were 2 calculi; in one case, 12; in another, 7; in another, 6. In case 2, the stone was encysted, and could not be removed. Of the 14 deaths, 9 were from exhaustion and low fever; 3 from peritonitis; and 2 from diarrhæa. 16 cases also operated on by Mr. Nundy are included in the Jung return.
Lateral, 352 ...	Not noted.	Not noted.	Unfortunately the number, weight, and composition of the stones in these cases have not been recorded. Many were of very large size. In 2 cases, where the age of the patients was 110 and 104, recovery took place
Lateral, 27 ...	1 0 20	Lithic acid, 27 ...	In case 12, the stones (3 in number); weighed 9 oz., the patient died of peritonitis. In all the other cases the stones were single.
Lateral, 22 ...		Lithic acid, 13 ...	In case 3, a contracted state of the bladder prevented the opening of the forceps. Cystitis supervened and proved fatal.
Median, 2 ...	0 4 9	Phosphate of Lime, 5 ... Oxalate of Lime, 3 ... Trip. Phosphate, 3 ... (one calculus lost)	In case 19, peritonitis set in within 24 hours, but was subdued at once. In case 20, great difficulty was experienced in extracting the stone; inflammation of the bladder set in afterwards. Case 21 died from exhaustion. In case 23, there was cystitis, which was overcome. In cases 10 and 23, there were 2 calculi in all the others, 1 only.
Lateral, 39 ...	Very imperfectly recorded.	.....	Number of calculi recorded in only 5 cases, when they were single.

TABLE
SHOWING the Particulars of 1,851

Name of Operator for the Dispensary.	Number of Cases.	Average Age of Patients.	Sex.	Caste.	Average Duration of Disease.	Average Mortality.	Average Number of days under Treat- ment after operation.
	Yrs. Mos.				Yrs. Mos.		
Asst. Surgeon Isaac New- ton, Civil Surgeon, Kur- naul	18 29 9	9	Male.	Mussalmans, 27... Hindoos, 21 ...	3 8	1 in 7-50 (excluding 3 doubtful cases.)	27
Dera Ghazee Khan Disp'y.	203 31 2	2	Do.	Mussalmans, 205... Hindoos, 58 ...	Not noted.	1 in 3-68 (excluding 35 doubtful cases.)	15 27 (as noted in 54 cases.)
Rajampore Dispensary	80 (as not- ed in 86 cases.)	30 5	Do.	Mussalmans, 45 ... Hindoos, 11 ... (as noted in 56 cases.)	Do.	1 in 4-21	(as noted in 54 cases.)
Asst. Surgeon J. Wilson Johnston, Civil Surgeon, Loodiana	109	Not noted.	Do.	... ..	Do.	1 in 9-08	22
Surgeon H.M. Greenhow ...	17 17 0	0	Do.	Mussalmans, 2... Hindoos, 15 ...	2 8	0 in 17	17

I.

Cases of Lithotomy. (Concluded.)

Nature of Operation.	Average Weight of Calculi.	Composition of Calculi.	REMARKS.
	Oz. Drs. Grs.		
Lateral, 41 ... Median, 5 ... Dr. Murray's, 3	0 7 57	Phosphates, 19 ... Lithic Acid, 15 ... Oxalate of Lime, 12 ... Not noted, 2	In case 20, it is noted that "this old man was greatly emaciated, almost pulseless, and apparently dying on admission. He hardly rallied from the effects of the Chloroform. He recovered without a bad symptom." In case 24, a branch of the pudic artery was divided and tied. No bad symptom ensued. In case 33, it is noted that "on one side of the calculus there had been recent adhesion to the bladder. Fibrin and mucus were adherent to the calculus after extraction. An attack of orchitis was easily reduced. Urine passed by urethra on ninth day." In case 43, "the prostate was enormously enlarged and the depth so great that I could not reach it with my finger; so a straight staff was introduced as a director to the forceps. An attack of orchitis delayed recovery." In case 44, there was "difficulty in seizing the calculus, owing to the bladder having contracted round it, like hour-glass contraction of the uterus. I managed to extract it from this cul-de-sac by the scoop, and then it was easily seized with the forceps. Urine passed by urethra on the ninth day." In several cases, there were 2, and in two instances there were 4 and 6 stones.
Not noted, probably Lateral...	0 6 43 (As noted in 59 cases.)	Not noted	Number of stones in each case not recorded.
Do.	0 7 49 (As noted in 17 cases)	Do.	In the cases noted, there was generally 1 calculus; sometimes 2, and once 3 were found.
An approximation to Dr. Murray's, 109 ...	0 8 37	Not noted	Nos. 39 and 71 were doubtful cases. One man was cut 3 times, and had been altogether cut 5 times. Dr. Johnston has known a boy cut twice in 14 months.
Lateral, 17 ...	0 7 12	Lithic Acid, 8 ... Triph. Phosphates, 5 ... Oxal. Acid, 4	Cases 3, 6, 8, 11, 13, 14, 15, and 16, were weakly and worn out subjects, but they recovered well. In case 13, there were 3 stones, the smaller of which had evidently broken off from the larger. In all the other cases the stones were single.

TABLE II.

SHOWING the Mortality in 1,585 Cases of Lithotomy at different ages. In this Table are included only such Cases as have both the age of the patient, and the result, distinctly recorded: all doubtful Cases are excluded.

Name of Operator or of Dispensary.	Number of Cases.	Number of deaths under 10 years.	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80 to 90	90 to 100	100 to 110
Asst. Surgeon S. C. Courtney	32	0 in 11	0 in 1	0 in 1	0 in 6	1 in 23	1 in 6	...	1 in 2	...	...	...
Asst. Surgeon W. E. Allen	29	1 in 15	0 in 4	1 in 3	0 in 1	1 in 2	0 in 2	...	1 in 2	...	...	...
Civil Asst. Surgn. W. C. Kiermunder	28	0 in 6	0 in 3	0 in 2	0 in 2	0 in 1	0 in 2	1 in 4	0 in 1	0 in 1	...	...
Civil Asst. Surgn. W. P. Dickson	25	1 in 13	1 in 3	0 in 2	0 in 3	0 in 2	0 in 1	1 in 4	0 in 1	...	...	...
Boothick Dispensary	29	0 in 15	0 in 5	0 in 3	0 in 1	0 in 2	0 in 1	1 in 2	...	...	...	...
Rawal Pindie Dispensary	131	1 in 48	1 in 2	1 in 23	1 in 50	1 in 34	1 in 0	1 in 3	1 in 3	...	...	...
Persepolis Dispensary	13	1 in 3	0 in 2	0 in 2	1 in 5	1 in 2	1 in 4	...	...	...	...	...
Jhang Dispensary	29	0 in 13	0 in 1	0 in 1	1 in 5	1 in 2	1 in 4	0 in 1	...	...	...	...
Dera Ismail Khan Dispensary	202	1 in 10	1 in 7	1 in 67	1 in 51	1 in 50	1 in 2	1 in 2	1 in 2	...	...	...
Umballa Dispensary	28	0 in 10	0 in 5	0 in 2	1 in 2	1 in 3	1 in 2	...	...	...	...	...
Allypore Dispensary	84	1 in 16	1 in 18	1 in 11	1 in 7	0 in 3	1 in 8	1 in 3	1 in 2	1 in 1	...	...
Seakote Dispensary	80	0 in 15	0 in 9	1 in 13	1 in 5	1 in 8	1 in 3	1 in 3	1 in 3	...	...	...
Sub Asst. Surgeon K. C. Nundy	139	1 in 47	1 in 16	1 in 15	1 in 50	1 in 11	1 in 3	1 in 6	1 in 3	1 in 1	1 in 1	0 in 2
Mooltan Dispensary	305	1 in 16	1 in 6	1 in 9	1 in 40	1 in 33	1 in 5	1 in 5	1 in 5	1 in 1	1 in 1	...
Jallundur Dispensary	25	1 in 13	0 in 5	0 in 2	0 in 2	1 in 2	1 in 2	1 in 1	1 in 1	...	...	...
Civil Asst. Surgeon F. A. Minns	24	1 in 13	0 in 4	0 in 1	0 in 8	1 in 3	1 in 1	0 in 1	...	...	...	...
Bumoo Dispensary	39	1 in 47	0 in 4	1 in 1	0 in 8	1 in 4	0 in 1	0 in 1	...	...	...	...
Asst. Surgeon Isaac Newton, Civil	45	0 in 14	1 in 13	0 in 3	1 in 1	1 in 4	1 in 3	1 in 5	1 in 2	...	...	1 in 1
Surgeon, Kurnool	229	1 in 51	1 in 50	1 in 3	1 in 12	1 in 27	1 in 2	1 in 40	1 in 1	...	...	...
Dera Ghasee Khan Dispensary	56	1 in 6	1 in 10	1 in 6	1 in 6	1 in 2	1 in 2	1 in 1	1 in 1	...	...	...
Madras Dispensary	17	0 in 9	0 in 4	...	0 in 2	0 in 2	...	...	...	...	...	...
Surgeon H. M. Greenbott	17	0 in 9	0 in 4	...	0 in 2	0 in 2	...	...	...	...	...	...

TABLE III.

SHOWING the Mortality in 744 Cases of Lithotomy according to weight of Calculi. In this Table are included only such Cases as have both the weight of the stone, and the result, distinctly recorded: all doubtful Cases are excluded.

Name of Operator or of Dispensary.	Number of Cases	Number of Deaths under											
		1 oz.	1 to 2 oz.	2 to 3 oz.	3 to 4 oz.	4 to 5 oz.	5 to 6 oz.	6 to 7 oz.	7 to 8 oz.	8 to 9 oz.	9 to 10 oz.	10 to 11 oz.	
Asst. Surgeon S. C. Courtney	32	1 in 20	1 in 3-50	0 in 3	1 in 2								
Asst. Surgeon W. E. Allen	23	1 in 21	1 in 5		1 in 1								
Civil Asst. Surgn. W. C. Kiermader	28	0 in 19	0 in 6	0 in 3	0 in 1	1 in 1							
Civil Asst. Surgn. W. F. Dickson	25	1 in 11-50	0 in 3										
Robtack Dispensary	28	1 in 12	0 in 3	0 in 1									
Rawal Pindia Dispensary.	122	1 in 30	1 in 8-25	1 in 5-33	1 in 3	1 in 3	0 in 3	0 in 1					
Farasapore Dispensary	18	1 in 4-50	1 in 3		0 in 1	1 in 1							
Jhang Dispensary	11	0 in 5	1 in 4										
Allypaur Dispensary	30	1 in 25	1 in 2	0 in 2	0 in 3								
Sealrods Dispensary	63	1 in 11-33	1 in 3-66	1 in 3	1 in 2	0 in 2							
Sub-Asst. Surgn. K. C. Nundy	86	0 in 45	1 in 6	1 in 8	1 in 2	0 in 2	0 in 1					1 in 1	
Jallundur Dispensary	25	0 in 12	1 in 6			0 in 2							
Civil Asst. Surgn. P. A. Minas	23	1 in 19	1 in 3	0 in 1									
Asst. Surg. Isaac Newton, Civil Surgeon, Karnal	42	1 in 14-50	1 in 9	1 in 3									
Dera Ghasee Khan Dispensary	65	1 in 13-66	1 in 9	0 in 3	1 in 3	1 in 1							
Bajapore Dispensary	17	1 in 11	0 in 4		1 in 2								
Asst. Surgn. J. Wilson Johnston, Civil Surgeon, Loodiana	109	1 in 9-67	1 in 10-33	1 in 5	1 in 4	0 in 1		0 in 1	0 in 2				
Surgeon H. M. Greenbow	17	0 in 11	0 in 4	0 in 1		0 in 1							

TABLE IV.

SHOWING the immediate causes of death in 259 fatal Cases included in this paper.

Name of Operator or of Dispensary.	Diarrhoea and Low Fever.	Diffuse Inflammation of the Pelvic Tissue of the Female.	Disease of the Kidneys.	Pyæmia.	Peritonitis.	Asthma.	Exhaustion after Operation.	Ulceration or Abscess of Bladder.	Narrow Pelvic outlet and consequent laceration.	Dysentery.	The effects of (Thorotum.)	Kyrtipelas.	Pneumonia.	Not recorded.	Total.
Asst. Surgn. S. C. Courtney	1	...	1	1	2	3	...	...	...	...	...	...	...	1	4
Asst. Surgn. W. E. Allen	4
Civil Asst. Surgn. W. C. Klemmer	1	1	...	...	...	...	...	...	...	...	7
Civil Asst. Surgn. W. P. Dickson	1	1	...	...	...	...	...	...	...	...	7
Robt. Dickson	14	14
Naval Asst. Surgn. W. C. Klemmer	3	3
Peritonitis	3	3
Thung Dispensary	34	34
Dera Isaid Khan Dispensary	1	...	...	...	...	...	...	...	...	...	...	...	...	5	5
Amritsar Dispensary	11
Amritsar Dispensary	11
Sealofe Dispensary	13
Sub-Asst. Surgn. K. C. Rundy	5	...	...	...	...	...	...	...	...	...	...	...	...	46	46
Madras Dispensary	3
Fullunder Dispensary	7
Civil Asst. Surgn. F. A. Minna	6
Bamcoo Dispensary	6
Asst. Surgn. Isaac Newton, Civil Surgn. Kurnul	63
Dera Ghases Khan Dispensary	19
Sealofe Dispensary	12
Asst. Surgn. J. Wilson Johnston, Civil Surgn. Louisiana	12
Total	8	6	1	3	17	13	17	3	1	2	1	1	3	184	259

CHOLERA,

ITS SYMPTOMS, CLINICAL HISTORY, PATHOLOGY,
DIAGNOSIS, PROGNOSIS, TREATMENT, AND
PROPHYLAXIS:

BY

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CHOLERA may be said to be, with perfect truth, the great disease and the great medical puzzle of the age. Although not unknown before, it is since the year 1817 that it has filled the civilized world with astonishment and alarm. Even yet the novelty about it continues unabated. Every wonderful story, every fabulous report, every new theory, connected with it, is still eagerly seized and anxiously examined. *The causes of cholera, the pathology of cholera, the treatment of cholera, and the prophylaxis of cholera* engage the attention of myriads of earnest and persevering minds. Treatises on cholera by cart-loads have been issued by the press. All the surrounding agencies,—air, water, earth, the animal, vegetable and mineral kingdoms, food, clothing, habitation, human intercourse, all the internal structures, the blood, the nervous system, the secreting organs, &c., have been ransacked in search of the cause; still the cause remains unknown. Most writers agree that it is a poison introduced from without, but

they are divided as to its communicability from person to person. Hence, there have arisen two great schools—the *Contagionist* and the *Non-contagionist*. The battles of these opposite camps have been long and hot, and waged with varying fortunes, till, at last, the contagionists seem to have triumphed for the present. The pathology of cholera is still a desideratum. This is, however, not due to any want of theory. As with respect to the etiology of cholera, so with regard to its pathology, there have been proclaimed all sorts of doctrines. It has been regarded as the cold stage of intermittent fever, as a disease of the blood, as gastro-enteritis, as, in the collapse at least, spasm of the pulmonary arteries, &c. Fierce war has been carried on by the advocates on the different sides, each party denouncing its opponents as obstinate fools. The treatment of cholera has been as various as its supposed causes and pathology, nay, even more various as it has been not unfrequently wholly empirical. It has been directed to the removal of the assumed cause, to the removal of the assumed pathological processes, to the arrest of the symptoms, to the support of the patient, to the supplying of the lost chemical elements, and, sometimes, to no known object. The upholders of each plan are enthusiastic about its success, and, in its strenuous advocacy, scruple not to call others murderers who may prefer a different one. The prophylaxis of cholera has been of two kinds, hygienic and specific. Hygienic prophylaxis consists in the observance of rules which promote and maintain a sound state of health. Specific prophylaxis contemplates the adoption of measures for the prevention of particular diseases. Thus flannel belly-bands, carrying about the person a piece of camphor, and marching out into camps, have been tried as preventives of cholera, and it is said with

marked advantage. Certain fruits and vegetables, which have acquired an unenviable reputation as being causes of cholera, are also proscribed with a similar view. In spite of all these measures, however, cholera will frequently break out, and then it is said to be due to unpreventable causes.

As a necessary result of all this contention, different ideas prevail upon the *Etiology, Pathology, Treatment and Prophylaxis* of this disease, which necessarily makes the information we possess upon it confused and often contradictory. The spirit of party reigns rampant where a confession of ignorance should obtain, and, instead of honestly testing their own pet theories, assault and defence occupy men's minds to the exclusion of all other interests.

In the struggle which ensues the vast importance of the subject is entirely overlooked; for, if writers always remembered that nearly one-half of the cholera cases died, and that cholera deaths were as 1 to 2 to 1 to 3 of the entire number of deaths from all diseases, at least in India, more sober thoughts might prevail.

So great is the obscurity which still overhangs this disease, that its very definition has been rendered uncertain by importing into it theoretical dogmas. Writers, therefore, variously define cholera according to their favourite crotchets. Some regard certain symptoms as essential to the disease, which others authoritatively deny; some bring into the definition of the disease, its causes and sequelæ; and some go still further and lay down for it a particular pathology. This, in the absence of definite knowledge, is only productive of error and distrust, for which there ought to be no excuse in so common an affection as cholera.

To avoid these opposite extremes, I shall make here a few brief remarks which may prove of service to the reader in the subsequent part of this paper.

I. *Definition.* The simplest and best definition of cholera seems to me to be that, *it is a peculiar disease characterized by purging, vomiting, cramps, and excessive thirst, passing more or less rapidly into collapse, which may terminate in death or reaction, the reaction often eventuating in recovery, but sometimes in death from cognizable causes.*

It is the simplest, because it accords with every day experience, and does not involve any theory. And it is the best, because although the purging, vomiting, cramps, and thirst are not always in due and invariable proportion, nor present together in every case, yet they characterize the disease in the vast majority of cases, and it is very rare, indeed, for cholera to occur without any of them. It is true such cases have been related by authors as having been observed at Teheran and other places, but I have never met with them myself, though I must have treated, at least, three thousand cases in private and hospital practices; nor has anybody else in Calcutta that I know of. It is not fair hence to permit such pathological curiosities to disturb the definition of a common and well-known disease, and thus to render our profession a laughing stock in the eye of ordinary men of sense.

Sometimes a true case of cholera is arrested ere it goes any further than the first stage; and then it is not unfrequently questioned whether it was cholera at all. This is tantamount to affirming that cholera never ends thus, and

that to be cholera it must pass through all the stages, *i. e.*, Invasion, Collapse, and Reaction. That line of argument bears absurdity on its very face. Cholera not only may, but often does, stop with the first stage, just as much as an inflammation of the pleura may be arrested in the stage before the occurrence of effusion. In fact it is in the treatment of this stage that astringents are of such great value, and why it is so important that all cases of so-called diarrhoea and indigestion during a cholera epidemic should be immediately stopped.

The collapse of cholera is so peculiar that there can be no mistake about it when it is once established. Many look upon it as the only essential sign, which may occur without any previous purging, vomiting, cramps, or excessive thirst, and extinguish life in a very short time. I cannot admit that this notion is correct, for then collapse would become the first stage, and no recovery could occur until that had been passed through. I look upon collapse as the second and the most dangerous stage, and that no hope of recovery can be held out until it is followed by reaction. At the same time the duration of the first stage is by no means always certain. It may be very long and directly exhaust the patient without being followed by collapse, or it may be so short that collapse comes on very rapidly. In the great majority of cases, the first stage lasts for a moderate time, say one, two, three, or four hours, before it is followed by collapse. But sometimes again the first stage may pass entirely unnoticed, and then collapse appears to occupy its place as in the extraordinary cases of rapid death already referred to.

The reaction does not necessarily mean recovery or secondary fever. It simply implies the return of the pulse

and animal heat. This often does lead to the restoration of health. But it is nearly as frequently beset with dangers which jeopardise life. Although the pulse and animal heat may have returned, there are so many organs, the regular discharge of whose functions is essential to life, that that circumstance alone is not sufficient. Some of these organs may have been in an impaired state previous to the attack, and the shock of the collapse may have altogether deranged their functions; or the blood or the nervous system may be at fault, and interfere with the proper discharge of their duties. Secondary diseases arising in this manner often end in death; or rather the non-restoration of healthy function in some part or organ necessary to life may cause death, although reaction may have occurred. In other cases, again, diseases altogether new may occur during the convalescence, while the patient is still weak, and so bring about death.

II. *Modes of Invasion.* The mode of invasion of cholera varies in different cases. These varieties, however, may all be included under two principal heads. The invasion may be either *Primary* or *Intercurrent*. By *primary*, I mean that class of cases in which persons previously in good health are suddenly attacked by cholera; and by *intercurrent*, that other class in which ill-health of some kind precedes the attack of cholera.

This distinction it is of great importance to bear constantly in mind; for on its apprehension will often depend the successful treatment of the disease, and the explanation of the morbid conditions discovered in the body after death. It will also enable us to understand the opposite assertions

that cholera is always preceded by what is called *the premonitory diarrhœa*, and that *the premonitory diarrhœa* is not necessary to an attack of cholera. The truth is, in the majority of cases no diarrhœa precedes cholera, but in many cases diarrhœa, dysentery, phthisis, hepatic abscess, small-pox, measles or some other affection, may be present at the moment of the attack of cholera. While, therefore, in those cases in which cholera occurs without any other malady being present at the time, the mode of invasion is primary, and the danger to the patient depends entirely on the severity of the disease itself; in those other cases in which it occurs in the course of another disease, the invasion is not only intercurrent, but also more dangerous to life inasmuch as he has then less power of resistance, and inasmuch as the mischief already begun by the previous illness may be suddenly completed by the severe shock to the system, even after the proper symptoms of cholera shall have passed away.

III. *Symptoms.* The symptoms of cholera are best studied under the three stages of it to which reference has already been made.

The *first stage* of the disease is characterized by purging, vomiting, cramps, and excessive thirst. Sometimes the purging, and sometimes the vomiting, is the first to come on.

In the primary cases the first stools consist of fœces largely mixed with water. They are very copious and loose, passed without any effort on the part of the patient. Their bulk and rapidity of passage are such as to attract his attention at once. They run from him and are beyond his control, springing his clothes before he has time to retire to

the bath-room. Presently they become more and more liquid and free from fæces, till at last they resemble in appearance the milk of a young cocoa-nut. In intercurrent cases, also, without any previous bowel-complaint, the stools have the same characters. But in cases where diarrhœa or dysentery happens to be present, the fæcal accumulation having been already removed, the liquid stools may begin to be passed from the first onset of cholera.

The vomited matter at first consists of undigested food, unless starvation has preceded the attack. It is wonderful after what length of time the food is rejected in these cases. The meal may have been eaten twelve or twenty-four hours previously, yet the whole of it may be thrown up with little or no alteration. Grains of rice, pieces of meat, and bits of potatoes are thus vomited up with no other change than being somewhat swollen from the maceration. As with the stools, the vomited matter is largely mixed with water. Hence the vomiting is very copious and free. In a short time it becomes entirely liquid, and its appearance changes to that of oil. Unlike the motions, the vomiting is attended with a considerable effort and great straining. The violence of these exertions directly reduces the patient's strength, while, at the same time, it throws the muscles of the abdominal parietes and the diaphragm into irregular contractions or spasms. When the vomiting is severe almost everything in the shape of drink or food is immediately rejected.

The cramps generally do not commence until the purging and vomiting have fairly set in. At first they are confined to the abdomen and felt immediately after the vomiting; by and bye they affect also the extremities. In cases where

the vomiting is mild or absent, they may be altogether confined to the extremities. Sometimes, especially in children, they are entirely wanting. In other cases, again, they may be very early in their advent, and constitute the most dangerous symptom.

The thirst, as a general rule, is excessive from the very first, and no amount of water seems to satisfy it. In some cases it is absent, or so mild as to be scarcely troublesome.

After a certain length of time these several symptoms, as a general rule, gradually subside or lead to collapse. They may subside spontaneously or from the action of medicines. In either case the recovery is rapid. But in some cases they neither subside nor lead to collapse. The purging may continue alone, or the vomiting may continue alone, or both purging and vomiting may continue at the same time, for days without any material depression of the pulse and animal heat, and death may result from exhaustion. It is rare for the cramps to continue in the same manner without the case passing into collapse.

The *second stage* is commonly known as the *Collapse*. It is announced by a rapid failure of the temperature and of the pulse at the wrist. The purging, vomiting, cramps, and excessive thirst, which characterized the first stage, continue to be present also in the second. To these, however, are now added other symptoms which may be classed as follows :—

- | | |
|----------------------------|------------------------------|
| 1. Failure of Strength. | 4. Failure of certain Excre- |
| 2. Failure of Animal Heat. | tions. |
| 3. Failure of Circulation— | Urine. |
| Heart. | Bile. |
| Pulse. | Carbonic Acid. |

- | | |
|--|---|
| 5. Failure of the Voice.
6. Excessive Restlessness.
7. Profuse Perspiration.
8. Peculiar expression of the
Countenance.
9. Sense of Heat.
10. Blueness of the Com-
plexion.
11. Shrivelling of the Skin
of the Extremities. | 12. Doughiness of the Skin
of the Abdomen.
13. Dyspnoea.
14. Dulness of Perception,
(Common sensibility.
Appetite, Vision, Hearing
Taste, Smell.)
15. Integrity of Conscious-
ness—The Intellect.
The Will.
The Emotions. |
|--|---|

The stools in this stage are clear, liquid, flocculent, of a peculiar smell, and resembling in appearance the fluid of the water-melon. They are numerous, few, or wanting; copious or scanty; and passed involuntarily under the patient. Sometimes they are thicker in consistence and appear like finely mashed turnips mixed with butter and milk. When death occurs in this stage, sometimes a similar substance is found in the bowels, which being mixed with water becomes the usual cholera-stools. In some other diseases the mucus of the small intestines is occasionally found to possess the same characters, and to produce an appearance like cholera-stools when diluted with water. Whatever the chemical composition* of these stools may be, they seem to consist of the ordinary secretion from the mucous lining of the intestines more or less diluted with water.

The vomited fluid is also clear, and though looking like oil, gives yet no oily feel to the finger. It is produced by

* Water, 987·95; organic matter and insoluble salts (earthy phosphates), 3·9; soluble salts (chlorates, phosphates, and sulphates of soda and potash), 8·1 = 1,000 parts.—*Dr. E. A. Parkes.*

the mixture of the mucus of the stomach with a large quantity of water. The mucus of the stomach is more tenacious than the intestinal mucus, and resembles in appearance the pituitual mucus rather than mashed turnips. It is dissolved with much greater difficulty than the other. But why there should be this difference between these two kinds of mucus I am sorry I cannot properly explain. The vomiting may be more or less frequent or altogether absent. It is more frequently present than not. Very often the food and medicines are all rejected. But sometimes they are retained.

The cramps are more severe and frequent in the second than in the first stage. They now painfully affect the extremities. The toes and fingers become bent and stiff. The calves are cramped into hard lumps, and agonising shrieks announce their onset. But the muscles of the abdomen and chest are also similarly affected. The recti abdominis, the diaphragm, and the lateral regions of the thorax especially suffer. The violence of these cramps is so great that they leave their unfortunate victim more and more exhausted after every new paroxysm. Sometimes, however, the cramps are entirely absent, and the patient lies comparatively placid.

The thirst, generally great in the first stage, becomes still more urgent and insatiable in the second. Cries of "water, water, water," incessantly break out, and the moment it is brought, the sickman clutches the vessel with both hands, and, half-lifting his head, drains it to the last drop before relaxing his grasp. The anguish is so intolerable that any fluid is welcome to him. Sometimes the patient, who appeared to be almost dying the minute before, will actually sit up, and even walk a few steps, in quest of water, although

he may sink down immediately after. The water is, however, generally thrown up as soon as it is drunk, or a few moments afterwards. Sometimes it is retained well. But in some cases of collapse the thirst is indifferent or totally absent.

The purging, vomiting, cramps, and excessive thirst may continue in full force throughout the collapse till death closes the pitiful scene, or a lull succeeds and ushers in the reaction. This is, however, not always the case. One or other, or two, or all of them, at times, may be absent during the second stage; and yet its other symptoms become fully developed.

With the advent of the second stage there ensues a sudden loss of muscular strength. The patient feels as if all his strength had at once deserted him. His sense of sinking is so great that, except when roused by cramps or by the agonizing thirst, he lies as if he were a corpse. He has no longer the power to leave his bed for the purpose of passing his evacuations, or to arrange his clothes to cover his nakedness.

Simultaneously with this his temperature rapidly falls. In the first stage it is either normal, or a little above it. In the second it is always below par. At first the extremities suffer, and the loss of heat is so great that they become icy cold, while the chest and forehead may still be warmer than natural. Gradually the coldness creeps up the legs and arms, and then the trunk also becomes cold, the lips, nose, and ears getting as cold as the fingers and toes. Presently even the tongue, the mouth, and the breath are not exempted; they are cold, and the expired air feels like the wind blowing over a glacier.

The circulation of the blood, which in the first stage is somewhat excited, in the second becomes gradually slower and weaker. The heart sounds grow feebler and less frequent. The pulse at the wrist diminishes in force, fulness, and frequency; then its rhythm becomes irregular; and at last its beats are no longer preceptible. This state of things lasts for sometime, the duration of which varies in different cases. Then either death ensues, or reaction sets in. In the latter case the heart's action again becomes stronger and more regular; and the pulse returns to the wrist and gradually regains its normal character. The pulseless state corresponds with the critical period. It marks the end of the second stage of the disease. After this one of two things happens, death or reaction. In the former event a change comes over the features, and the temperature, instead of being below that of the surrounding air, rises up to it, while the aspect of death settles on the countenance. In the case of reaction, the phenomena vary in different persons. In the majority of recoveries, the improvement in the circulation is rapid, steady, and permanent. In others it is more or less retarded by circumstances, although ultimately becoming permanent. In a third class, however, sooner or later, the pulse again fails and death generally follows. This failure of the pulse is secondary to exhaustion or some other cause, and should not be confounded with the primary failure during collapse.

One of the most remarkable features of this period is the failure of certain excretions, *viz.*, urine, bile, and carbonic acid. . .

As the first stage advances, the urine becomes more and more scanty. . With the approach of the second stage it is no longer excreted. The hypogastrium, on percussion,

sounds clear, and catheterism meets with no fluid. This state may be coincident with a profuse discharge from the alimentary canal and skin, or not. If the former, the danger is less urgent; if the latter, it is very grave. In favourable cases, the suppression of urine ends with the reaction. In deaths during the collapse, the urine is not restored at all after it is once stopped. In other instances, again, although reaction may have set in, the suppression may still continue more or less, and endanger the safety of the patient.

Similarly, the bile also disappears from the stools and the vomited matter. The evacuations from the bowels and stomach are, during the collapse, perfectly colourless, and give no biliary reaction on being chemically tested.

The carbonic acid, which is so largely discharged in ordinary respiration, is either greatly diminished or not to be found at all in the expired air, although the stethoscope shows the inspiratory and expiratory murmurs to be rather exaggerated than otherwise.

It is somewhat remarkable that all these excretions depend on venous blood, and that the organs from which they proceed are all provided with a portal system.

The failure of the voice is another peculiarity of note. Early in the disease the voice loses its natural character. But it is in the stage of collapse that it undergoes the greatest alteration. At first it becomes hoarse and weak; a little later it is husky; and later still it is reduced to the faintest whisper; nevertheless every word seems to be distinctly sounded, and no difficulty is experienced in understanding what is said. On examining the throat it is found to be quite clear. There is no inflammation, swelling, or obstruction

of any kind. The tongue and mucous membrane are perfectly moist. The respiratory sounds are good. This remarkable change in the voice cannot be due, therefore, to the fault of any of these parts. It arises, hence, probably from the same cause which produces the muscular debility already noticed. When recovery takes place the strength of the voice is slow in returning, unless the previous stages have been mild.

The excessive restlessness is so striking that even the most superficial observer cannot fail to notice it. It is not wholly accounted for by the cramps, vomiting, purging, and thirst. The patient finds no relief in any position. He turns round from side to side, tosses about his arms and legs, attempts to sit up, and sinks back in bed, without finding any rest. The restlessness is so great that attendants have to be specially posted to prevent his falling out of bed. All this only increases the exhaustion. A few minutes before death the restlessness is succeeded by a calm; and a similar lull precedes also the advent of reaction. It may again return during the third stage from secondary causes which will be hereafter explained.

Unlike the first, the second stage of cholera is characterized by profuse perspiration. Cold drops of sweat gather on the forehead and chest, while the hands and feet are clammy and shrunk. The whole body is more or less wet; and the drain from the skin becomes now an additional source of exhaustion. The sudoriparous glands seem to be universally excited, and the perspiration covering the surface emits an unnaturally sickly odour. In females the secretion of milk is now augmented, and while the mother may be actually struggling in the throes of death, her infant may often be found vigorously sucking her breasts. It is to be presumed that the same cause which increases the secretion from the

skin, increases also the secretion of the mammae which are nothing but cutaneous glands. As reaction advances the perspiration becomes less, though if death occur during the collapse it continues profuse to the last.

The countenance in the second stage assumes a peculiar expression. The eye-lids are surrounded by a dark areola and generally half-shut. The eye-balls sink deep in their sockets, and their whites are turned up so as to be visible through the half-parted lids. The nose is blue, pinched, and sharp. The cheek-bones are unduly prominent. The lobes of the ears and the lips are blue and cold. And the teeth dry and apparently whiter than natural. Over all this there hangs a kind of stupor; while the sepulchral voice, the cold sweat, and the lethal breath add not a little to the ghastliness of the expression.

After death the countenance changes for the better; and so too when the collapse is succeeded by reaction.

While his body is felt to be icy-cold by every bye-stander, the patient himself incessantly complains of feeling hot, and, throwing off his clothes, desires to be constantly fanned. Hot fluids are distasteful to his palate, and he for ever calls for pieces of ice or iced drinks. Cold is more grateful to him than heat. Herein lies the great distinction between the collapse of cholera and the cold stage of intermittent fever. In the latter affection the patient feels very cold, shivers, and wishes to be covered with four or five blankets; in the former he complains of heat, throws off all clothes, and courts cold drink to allay the sensation of heat. This sensation continues till death or reaction ensues. With the former all sensation is lost; with the latter the normal sensation returns, and the patient submits without murmur to all the

orders of the physician. This does not, however, take place till the reaction has commenced.

The complexion generally grows darker than natural. In certain situations, as under the nails, in the skin of the fingers and toes, in the lips, nose and ears, it turns blue. Hence, blueness of the complexion is counted as one of the symptoms of the second stage. It is variously said to depend on the presence of unburnt carbon in the blood, and on certain physical alterations in the constituents of the blood. The blood becoming poorer in water, salts, and albumen, its consistence is thicker, and its corpuscles are altered in shape. From this its colour grows darker. The respiratory changes being arrested, the usual combustion of the carbon in the blood does not take place; it accumulates unburnt. This accounts at the same time for the failure of the animal heat, the absence of the carbonic acid in the expired air, and the blueness of the complexion. As there is no carbonic acid given out, so there is no oxygen absorbed by the pulmonary capillaries. There occurs, therefore, no endosmose and exosmose between the blood in the vessels of the lungs and the air in the pulmonary cells, nor is the iron in the hæmatine peroxidized as in ordinary respiration.

The skin of the hands and feet becomes shrivelled, as if after long maceration in cold water. This is no doubt the result of the action of cold, and of the profuse perspiration. But why it takes place when the temperature of the atmosphere equals, nay exceeds, that of the blood, is an enigma which has yet to be explained. Granted that no heat is generated within the body, granted that the nutritive and the respiratory changes are arrested, still the body should be of the surrounding temperature, by radiation and absorp-

tion. That it is not must be due to some other cause. It cannot be due to the loss of water from the alimentary and cutaneous surfaces carrying off a good deal of heat with it; for that would equally affect the whole body. Nor is it to be accounted for by the slowness or stasis of the circulation alone. View it how one may, it is still a remarkable phenomenon.

But while the iciness characterizes the hands and feet, and the skin over them is shrivelled, the skin of the abdomen and chest suffers a great loss of elasticity. In the ordinary state if it be raised into a fold and let go, it immediately recovers its natural level. In cholera this takes place by a slow process, like a mass of putty or dough returning to its level after being pressed up between the fingers. This state is particularly marked during the collapse, but wears off after reaction.

A certain amount of dyspnoea exists in the second stage, especially when the collapse is very deep. It is directly due to the spissitude and slow movement of the blood through the pulmonary capillaries. From the loss of water the serum is greatly reduced, and the blood-corpuscles are closer together. The white corpuscles are hence more densely crowded along the walls of the containing vessels than they are in health. From this cause, as well as from the extreme cold causing some contraction of their muscular fibres, the blood moves with great slowness through the pulmonary capillaries. To this has to be added the weakened force of the heart itself, and it is only then that the amount of obstruction will be fully realized. But as long as life lasts, the passage of the blood through the lungs in the collapse is never quite closed; it still finds its way to the left side of the heart, though at a slower rate than

before. It is, however, not ærated and bright-red; but dark like the venous blood, and as such circulates through the systemic arteries. As a result of all this, the right side of the heart and the pulmonary arteries are gorged with this dark blood; and dyspnœa follows.

Dulness of preception is another noticeable symptom. It appears to be universal and not confined to one or two senses only. Although painful cramps afflict the muscles and a burning thirst tortures the throat, the common sensibility of the skin is blunted throughout. The tactile bodies lose their delicacy of touch, and ordinary pinching is scarcely complained of. Even blistering applications sometimes fail to irritate the skin. This may be partly due to the coldness of the surface and retrocession of the blood; but it must also partly arise from some deadening effect upon the peripheral nerve filaments themselves.

The appetite is nearly altogether absent; and when the patient takes any nutriment it is generally in the form of drink.

The vision grows dim, but, there being little or no delusion, any person or object that is seen is correctly described.

The hearing is difficult, and it is often necessary to speak louder than usual before the patient understands what is being said to him. On such occasions he looks as if he were awaking out of a sleep, and, after an impatient response, falls back again into his former state of stupor.

The sense of taste is so thoroughly blunted that he does not stop to notice the taste of anything that is placed in his mouth, further than that it allays his thirst or burning sense of heat. If it be a liquid he gulps it down at

once, though the next moment he may have to bring it up again. If it be a cold solid as a lump of ice, he keeps it in his mouth and relishes it on account of its coolness.

The sense of smell is quite as blunted as any of the other senses, and requires, therefore, no particular notice.

With all this, however, the integrity of the consciousness is maintained. The emotions retain their usual force. The intellect, though weak, when called into exercise reasons with correctness. The will, by a strong effort, performs acts for which it would, under other circumstances, be considered incapable. The affections are strong, though the sufferer is conscious of his fate.

The *Third Stage* of cholera is commonly known as the *Reaction*. When death does not occur in the second stage, the reaction follows the collapse. It is usually preceded by a lull, during which there are no purging, vomiting, and cramps. In uncomplicated reaction these may never recur if the case be uninterfered with; but unfortunately the two first are often excited by injudicious treatment, and they may all recur in some of the secondary affections.

The third stage is ushered in by the return of the pulse to the wrist, and of warmth to the skin. The moment this has occurred, the disease has entered upon a new phase, and its symptoms are changed. Now, if the person have been in good health previous to the attack, and if no serious disease have been kindled up in the meantime, the improvement may progress uninterruptedly, and speedy recovery be the result. This happy termination, however, is often prevented by a variety of causes.

In a favourable case, with the return of the pulse and natural temperature, the complexion regains its clearness; the shrivelled condition of the skin of the hands and feet disappears; the doughiness of the skin of the trunk is no longer noticeable; the excessive thirst, restlessness, sense of heat, dyspnœa, and dulness of perception cease to exist; the expression of the countenance returns to its natural aspect; the muscles and the voice regain their former vigour; and the kidneys, liver, lungs, and heart resume their wonted functions. Even the stomach and intestines recover themselves, and digestion and nutrition go on as if nothing had occurred.

The causes which obstruct this desirable result are as follows:—1, Pre-existing Disease; 2 Secondary Disease.

The principal pre-existing diseases which interfere with the progress of the reaction may be enumerated as follows:—

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| 1.—Of the Blood— | Ulceration. |
| Fever. | 4.—Of the Intestines— |
| Anæmia. | Worms. |
| Scrofula. | Diarrhœa. |
| Tuberculosis. | Dysentery. |
| Syphilis. | 5.—Of the Kidneys— |
| Rheumatism. | Pyelitis. |
| Gout. | Nephritis. |
| Dropsy. | Abscess. |
| 2.—Of the Nutrition— | Bright's Disease. |
| Grôwths. | 6.—Of the Urine— |
| Degenerations. | Diabetes. |
| 3.—Of the Stomach— | Lithiasis. |
| Dyspepsia. | 7.—Of the Lungs— |
| Gastritis | Hæmoptysis. |

Emphysema.	Malarious Enlargement.
Gangrene.	10.—Of the Heart—
Hooping Cough.	Endocarditis.
Asthma.	Pericarditis.
Phthisis.	Valvular Disease.
Bronchitis.	Dilatation.
Pneumonia.	Hypertrophy.
Pleurisy.	Atrophy.
Empyema.	Fatty Degeneration.
8.—Of the Liver—	Aneurism.
Cirrhosis.	11.—Of the Skin—
Hydatid.	Small-pox.
Hepatitis.	Measles.
Abscess.	Erysipelas.
Malarious Enlargement.	12.—Of the Nervous System—
Fatty Degeneration.	Asthenia.
9.—Of the Spleen—	Paralysis.
Splenitis.	Insanity.
Abscess.	Delirium Tremens.
Gangrene.	

It will be observed that many of these diseases are of a serious character, and sooner or later, would themselves destroy life. How much greater must be the danger when cholera supervenes on them! And yet their presence is not always known. When they have been under treatment previous to the attack of cholera, on the occurrence of this the experienced physician at once recognizes the imminent risk to which his patient is exposed. He expects death every moment, and it may occur in either of the previous stages. But sometimes, strange to say, those stages are safely passed through, and reaction actually sets in. When, however, the patient comes under treatment for the first time with choleraic

symptoms and his previous history is unknown, the urgency of the case often prevents that careful examination which would be required to detect such diseases, and they may pass unnoticed till the advent of reaction. But whether recognized before or during the third stage, or in the dead-house, their influence on the course of the reaction is very serious indeed. They impress upon it their own peculiar symptoms and sequelæ, and if recovery take place at all, it is generally after an obstinate struggle. The progress of the pre-existing malady, which was temporarily arrested during the evacuation and algide stages, proceeds apace as soon as the circulation and animal heat are re-established, and, before the constitution has recovered from its shock, effects such changes as are inconsistent with life: or the affected organ or portion of the body never again acts, and the matter, which it used to eliminate, remains in the blood and operates as a poison to the nervous centres and the rest of the economy: or such a state arises as to lead to sloughing and various other affections.

Thus, if chronic intermittent fever, anæmia, scrofula (tubercular leprosy, &c.) tuberculosis, constitutional syphilis, chronic rheumatism, chronic gout, dropsy, or cancer, have been in existence for some time before the attack of cholera, although the case may sometimes reach the third stage, yet the patient may never recover his strength, and expire from sheer exhaustion after the essential symptoms of cholera have long disappeared: or, if there have been present fatty or granular degeneration, the function of the organ so affected may never be restored, as in Bright's disease of the kidneys: or, if the stomach have been at fault from chronic dyspepsia, chronic gastritis, or chronic ulcer, digestion may never return, and death take place from inanition: or, if the intestines have

been the seat of disease from the presence of chronic diarrhoea or dysentery, the peculiar symptoms of these may become aggravated during reaction and cause death: or, if the kidneys have been diseased, as in pyelitis, desquamative nephritis, abscess, &c., their action failing, urea is retained in the blood, and acts as a poison to the brain: or, if the urine have been diseased, the patient may recover after a long struggle, or sink under exhaustion: or, if the lungs have been diseased and the patient survive till the third stage, the destructive power of such diseases as phthisis, bronchitis, pneumonia, pleurisy, emphysema, gangrene, hooping cough, and asthma, becomes infinitely more aggravated: or, if the liver be diseased, or spleen be seriously affected, recovery may become absolutely impossible: or, if the heart be diseased, such diseases during the reaction may protract the improvement: or, if there be small-pox, measles, or erysipelas, the case will generally die, even after the evidence of reaction, should it last so long: or, lastly, if the nervous system be diseased, great depression of the vital powers may continue in the third stage, and sloughings, abscesses, and mental and other aberrations may result, which may or may not endanger life.

The principal secondary diseases, which cause death during the third stage of cholera, are as follows:—

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| 1. Pulmonary Embolism. | 8. Delirium. |
| 2. Pulmonary Congestion. | 9. Coma. |
| 3. Gastritis. | 10. Meningitis (convulsions.) |
| 4. Enteritis. | 11. Fever. |
| 5. Diarrhoea. | 12. Extensive Sloughing. |
| 6. Dysentery. | 13. Extensive Abscesses. |
| 7. Suppression of Urine. | 14. Renal Congestion. |
| 15. And Accidents during the Convalescence. | |

They may occur at various intervals from the commencement of the reaction, sometimes within half an hour, and sometimes not till after several hours. The very fact of the return of the pulse and temperature, for however short a time, makes a great change in the quality of the blood and the vital actions dependent on it.

Pulmonary embolism consists of obstruction of the flow of blood through the lungs. It is due to the plugging action of coagula in the right cavities of the heart, the pulmonary arteries, or their branches. These coagula are composed of decolorized fibrin or red clots. The former are more frequent in the cavities of the heart and the main trunks of the pulmonary arteries; the latter in the smaller branches of those vessels. On the occurrence of reaction the blood seems to have a great tendency to coagulation, and this, therefore, takes place very shortly after. The case may appear to be doing very well, when all of a sudden difficulty of breathing sets in, though the respiratory murmurs are full and strong, the pulse disappears, the temperature falls, a cold perspiration covers the surface, and death steps in when it was least expected.

Pulmonary congestion comes on later and more slowly than embolism. Its advent is also heralded by dyspnoea; but the dyspnoea continues for a longer time. Before death takes place, and is attended with weakness of the respiratory sounds. Sometimes it co-exists with embolism, or rather embolism supervenes upon congestion. Simple congestion is sometimes recovered from; but when complicated with embolism never. In congestion all the pulmonary capillaries are gorged with red blood, and, the pulmonary vesicles or air-cells being compressed between them, the respiratory sounds are weak, unlike what obtains in the first and second stages of cholera.

While in pulmonary embolism death is directly due to the sudden arrest of the circulation through the lungs and accumulation of blood in the right side of the heart, the respiratory sounds being good, in pulmonary congestion it arises from apnoea owing to the more or less complete obliteration of the air-cells from the pressure of the accumulated blood within the lungs, and consequent weakness of the respiratory sounds. When pulmonary embolism supervenes upon pulmonary congestion, the symptoms of both those conditions co-exist, and the fate of the sufferer is inevitably sealed.

Gastritis or inflammation of the stomach is sometimes set up during reaction, or rather becomes troublesome. It is characterized by pain at the epigastrium, hiccup, and severe vomiting. The stomach is intolerant of almost everything, and when there is no food or medicine to reject, there is often violent and painful retching, succeeded by the throwing up of some bilious fluid. There are also nausea and increased thirst. Along with all this the skin is more or less hot and dry; the pulse frequent; sleep disturbed or absent; bowels sometimes confined, sometimes loose; body emaciated; strength reduced; countenance anxious and indicative of suffering. If unchecked by treatment, the vomiting may persist till exhaustion, and then death is the result. But sometimes it stops spontaneously after a time, and the patient slowly recovers his health and strength. Whether its resolution be spontaneous or due to treatment, the gastritis always leaves behind lesions in the stomach which require time for their removal. Any plastic effusion cannot be got rid of at once; but even the blood vessels which have been over-distended from congestion, and the secreting structures which have been oppressed and unfitted for their usual functions for the moment, are long before they recover their natural tone.

Hence, the digestion remains weak and the appetite bad for several days after every evidence of the inflammation has disappeared.

Sometimes congestion of the liver or spleen, or enteritis co-exists with gastritis, and then other symptoms are present, and add to the difficulties of the case.

Enteritis shows itself by griping pain in the bowels and by a return of the diarrhœa. The abdominal muscles, especially the recti, become more or less tense, and the intestines tympanitic from distension with flatus. The motions are small, frequent, and liquid, but more or less coloured, and discharged with wind. There is usually no vomiting unless the stomach is also implicated. The tongue is red, dry, and raw or furred; thirst increased; appetite bad; skin dry and warm; pulse weak and frequent; countenance, sleep, prostration, &c., as in gastritis. The patient may die exhausted by the diarrhœa; or, the inflammation subsiding spontaneously or from treatment, recovery takes place sooner or later.

Diarrhœa may also be merely the recrudescence of the purging which had subsided during the lull preceding the reaction. In this case there need be no fresh enteritis, nor is the diarrhœa necessarily fatal. In many cases it gradually declines, and recovery takes place. In some it continues severe, and is then followed by exhaustion, uræmia, pulmonary congestion, or dysentery, from either of which the patient may die. In this diarrhœa the motions are not coloured, but have the same characters as during the collapse. They are liquid, colourless, copious, turbid, but more offensive in smell than in the collapse. As long as the diarrhœa lasts there is usually no head symptom, although the urine may not have been secreted for days; but the moment it is arrested stupor

supervenes, and then all the usual consequences of uræmia follow. Diarrhœa under these circumstances is salutary, being an effort of nature to get rid of the retained urea.

Dysentery set up during the third stage is much later in its advent than diarrhœa, as will have been gathered from the preceding remarks. Diarrhœa, as already shown, often acts as a counterpoise to the suppression of urine by eliminating the retained urea. But sometimes it itself undergoes a change, and merges into dysentery. This dysentery is, therefore, uræmic in origin, and, while it still serves to keep the head clear of the evils of uræmia, it may occasion very serious lesions in the large intestines. The stools show the nature of these lesions if carefully washed and examined. They are slimy, liquid, more or less streaked with blood, highly offensive, and on washing yield a large quantity of ropy mucus. Sometimes molecular, and sometimes tolerably large sloughs, are found in them in a later stage. This uræmic dysentery may get well without much trouble, but sometimes not till after the discharge of one or more sloughs. When it has gone on to sloughing, the convalescence is tedious, and has special dangers of its own. Very often in such cases death is the result; and, then, it is preceded by great depression of the vital powers, passage of stools and urine in the bed-clothes, and other disgusting symptoms which make the patient a loathsome object to his attendants. Incapable of swallowing his food or lifting a finger to help himself, sustained for a time by the constant exhibition of stimulants, unable to communicate his wants by intelligible words, reduced to the last extremity of feebleness and emaciation, an eye-sore to nurses and clinical clerks, he at last sinks to the infinite relief of everybody.

Suppression of urine is always regarded as a serious symptom. It is so very remarkable that it attracted the attention of the earliest observers of cholera. The horrors of it are present to the mind of every physician. By those who have not had a large experience of this disease they are often greatly exaggerated, and the fear thus inspired not unfrequently blinds the mind to the perception of common-place facts. Hence, the assiduity with which the secretion of urine is watched, and the alarm at the least sign of its cessation. There are not a few physicians who look grave upon a case in which there was no urine even in the first and second stages; and who begin to dose their patients with diuretics, and avoid opium from fear of uræmic coma, even before the collapse has actually set in. All such practitioners would hold themselves bereft of reason if they considered for a second the utter groundlessness of their dread. There is nothing to be feared from the absence of urine in the first and second stages, and often for a time even in the third. The great loss of water from the alimentary tract and skin is a sufficient reason for this. But there is another, because the discharge from these surfaces does really carry off also a good deal of urea as is crucially proved in the third stage, when, although the urine is suppressed, yet so long as free evacuation takes place from the stomach or the bowels, the comatose condition does not come on. It is futile, therefore, to give diuretics in the first and second stages, or even in the third, so long as vomiting and purging, or either, continue, for they are not wanted; and it is equally unreasonable to tremble from fear of uræmia, and to religiously exclude from the treatment opium and other narcotics under such circumstances.

The time when suppression of urine does portend danger, is when it continues after the vomiting and purging have

stopped during the reaction. Then the urea accumulates in the blood and acts as a poison to the nervous centres. It is very soon followed by stupor and redness of the conjunctivæ. The countenance grows heavy and the respiration laboured. Presently coma and stertorous breathing supervene, and the patient dies, with or without convulsions. Sometimes, however, even after the occurrence of stupor, the secretion of urine may be restored, when the bad symptoms one after another may gradually go off, or continue till a crop of boils makes its appearance, or sloughing of some portion of the body takes place, and then subside. At other times, the elimination of the urea continuing imperfect, febrile symptoms are ushered in, and if recovery be the result, it is after prolonged suffering, during which the most thoughtful tending and anxious care are required from the attendants.

Delirium is an occasional symptom in the third stage. It seems to be more common in cases where large quantities of brandy or other alcoholic stimulants are administered, than where they are abstained from or used in moderation. When delirium is the predominant affection, lasting for sometime, it is followed by extreme exhaustion during which the patient expires.

Coma, as already stated, is an attendant of uræmia, and implies a diseased condition of the kidneys. Whenever it comes on it imports the gravest danger to life, although sometimes I have known cases to recover from this state. If it be due to narcotic medicines, they should be at once stopped, and then the case may recover as soon as their effects wear off.

Sometimes, along with the coma, there are great restlessness, intolerance of light, and muscular twitchings, the

patient dying at last in convulsions. In these cases the meninges of the brain are found more or less inflamed, the meningitis being probably due to the same cause as the coma, *i. e.*, uræmia.

The fever, which sometimes occurs during the reaction, is of low type, and has been denominated typhoid. It is not, however, always deserving of that name; for it is occasionally decidedly malarious and paroxysmal. Prominence of Peyer's patches is often found in cholera without any fever, nay even in deaths from collapse; while it is not always found when fever has been present.

Extensive sloughing may take place from the vital powers continuing low, especially of parts subject to pressure as over the sacrum. It also affects often the corneae, penis, scrotum, tip of the nose, &c.

Extensive abscesses, boils, or carbuncles may form in the thighs, calves, and various other situations (parotid glands, &c.), from the retention of some morbid matter in the blood.

Renal congestion is inferred when a dull, heavy pain or aching is felt in the loins along with suppression of urine. It comes on in the same way as similar congestion of the lungs and liver, and is sometimes removed by cupping and mustard sinapisms over the parts.

Besides the above, various other diseases may attack the patient during the convalescence. Thus measles, small-pox, croup, diphtheria, or pneumonia may break out before he has sufficiently recovered his strength. Their occurrence is, however, simply accidental and not in any way related to cholera; and when they end in death, such deaths are hence never credited to it.

IV. *Clinical History.*

I shall proceed now to the Clinical History of cholera. Instead of describing it in abstract terms, I shall endeavour to illustrate it by the narration of cases. For the complete execution of this project it would be necessary to give both recoveries and deaths; but this, I think, can be dispensed with after the remarks in the above pages. I shall, therefore, confine myself to the cases of death, which will quite suffice to show the different stages, their treatment such as it is, and the morbid appearances discovered after death. This, while keeping down their number, will afford me the opportunity of speaking with greater advantage of the pathology of the disease, and other topics of interest hereafter.

With this brief explanation I must now beg the reader's attention to the following cases from 1 to 63, the headings of which will sufficiently indicate their points of interest.

CASE 1.

CHOLERA, COLLAPSE, DEATH IN 7 HOURS.

Congestion of the intestines, kidneys, and lungs; prominence of the solitary glands; desquamation of the renal epithelium; atrophy of the spleen and liver; fulness of the gall-bladder.

Belah, aged twenty-five years, an Ooriah, driven into town by the Famine, was admitted into my ward at 11 A.M., on the 14th June, 1866, having been picked up by the Police on the Baliaghant Road. He had arrived at Calcutta only the day before; was taken ill with purging and vomiting only on the morning of his admission; had passed several stools; vomited many times; but had not made water.

His pulse was scarcely perceptible at the wrist; body cold; extremities icy cold; eyes sunken; muscles free from cramps.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; a mustard plaster to the epigastrium; brandy and ice; and milk and sago for diet.

At 12 noon he had no pulse; was very restless; and had great difficulty of breathing.

In half an hour more he was gasping for breath.

At 1 P.M. he was dead.

Post Mortem Examination twenty hours after death. The mucous membrane of the ileum was deeply congested, that of the large intestine of a pale-rose colour, the solitary glands in both were very prominent and swollen; the liver and spleen were atrophied, gall-bladder full of bile; the kidneys were congested, and the uriniferous tubes on pressure yielded a milky juice; the lungs were congested posteriorly;—the heart was healthy.

CASE 2. .

CHOLERA, COLLAPSE, DEATH IN $8\frac{1}{2}$ HOURS.

All the internal organs congested.

Omesh, aged thirty-five years, a Hindu sweetmeat man, was admitted into my ward at $2\frac{1}{4}$ P.M., on the 21st June, 1866.

He was ill with purging and vomiting only since one o'clock that afternoon; had had six watery stools; vomited once; passed no urine.

He was uncommonly prostrated; his eyes were sunk; pulse small and weak; temperature below par; voice low and husky; he had no cramps.

He was given a dose of Tannic acid mixture; stimulant mixture \mathfrak{z} i every quarter hour; brandy 2 measures; ice 1lb. and hot sago.

At 4 P.M. he was a little drowsy; had had two stools; vomited once; made no urine; was very thirsty and restless; had no pulse at the wrist; was quite conscious when roused.

At 6 P.M. he had had no stool; no vomiting; no urine; was restless and constantly changing his position in bed; had no pulse at the wrist; and was icy cold to the feel.

At 9½ P.M. he was gasping for breath.

Immediately afterwards he was dead.

Post Mortem Examination eleven hours after death. The whole tract of the alimentary canal, from the stomach to the rectum, was of a pale-rose colour; the liver was enlarged and deeply congested; the spleen of double its natural size and congested; the lungs and kidneys also very much congested; the right ventricle of the heart contained fluid venous blood, the left was empty.

CASE 3.

CHOLERA, COLLAPSE, DEATH IN 9 HOURS.

Congestion of the intestines and other viscera.

Gungaram, aged twenty years, a Hindu beggar, was admitted into my ward at 8½ P.M., on the 15th August, 1865.

He had been ill with purging and vomiting since 5 P.M., had passed five or six copious stools; vomited twice; passed urine once only, and that with the first stool.

He was much prostrated; and suffering from severe cramps in both the upper and lower extremities; his pulse was exceedingly feeble; temperature not very low; thirst very great.

He was ordered Lead mixture ℥i immediately; Ether mixture ℥i every half hour; ginger friction to the parts affected with cramps; brandy 1 measure; ice 1lb.; sago diet.

At 10 P.M. two stools; no vomiting; no urine; pulse scarcely perceptible at the wrist.

Lead mixture repeated; other medicines continued.

At twelve midnight no pulse; breathing hurried; skin bedewed with cold clammy perspiration.

At 1½ A.M. the same night he was gasping for breath.

At 2 A.M. he was dead.

Post Mortem Examination six hours after death. Weather cloudy, cadaveric rigidity present in all the extremities, especially the upper. On opening the abdomen nothing particular was observed; intestines moist; their mucous membrane was congested, in the large intestine of a uniform rose-colour, in the small here and there in retiform patches; the other viscera were also congested more or less.

CASE 4.

CHOLERA, COLLAPSE, DEATH IN 9½ HOURS.

Congestion of the intestines and kidneys. Affection of the solitary glands and Peyer's patches.

Sosamar Singh, aged thirty years, a Hindu chowkeydar, was admitted into my ward at twelve noon, on the 10th August, 1865.

He was ill with purging and cramps in all the extremities since the morning; but no vomiting. He was well built; his pulse was small but regular; stools watery, copious, frequent; cramps severe; thirst very urgent; urine said to have passed with the stools; there was no vomiting at all.

He was ordered Lead mixture ℥i one dose; Ether mixture ℥i every quarter hour; mustard plasters to the pit of the stomach, arms, and legs; thin sago four times a day.

At five P.M. his pulse was very feeble, he was very weak and thirsty; and had passed many stools since admission.

He was ordered brandy and ice.

At 8½ P.M. he was passing stools in the bed-clothes; had no pulse at the wrist; had had no urine; no vomiting; his respiration was difficult and hurried.

At 8¾ P.M. he was gasping for breath.

At 9½ P.M. he was dead.

Post Mortem Examination eleven hours after death. Weather cloudy, extremities rigid: On opening the abdomen no effusion or adhesion was seen; on slitting up the alimentary canal, the mucous membrane from the stomach to the rectum was found to be of a light rose-colour; in the lower part of the rectum it was covered with little light-coloured roundish prominences, having a transparent centre and looking like boiled barley grains; on puncturing the transparent part a little serum exuded, and a ring of the mucous membrane was left surrounding a small ulcer, the light-coloured swelling subsiding at the same time; further up, interspersed with the light-coloured bodies, were little pits; similar nodular bodies, with the transparent centre and ulcers, were found throughout the colon as far as the ileocolic valve, gradually diminishing the higher they were examined. On the iliac surface of that valve there was a broad and prominent Peyer's patch, filled with a coloured material in part, and partly occupied by light-coloured bodies with a transparent centre, the same as in the colon, only more densely arranged; about an inch further on there was a second Peyer's patch, still larger and similarly affected; and lying between and around them close-set nodules, looking like grains of *Arur-dall*. On removing the mucous membrane from the surface of these, in some cases they looked like nodular masses of fibrin, in others a fluid escaped on pressure. On very close inspection, in the centre of these, especially the larger ones, was found a very minute transparent speck. From the last-mentioned Peyer's patch to the end of the ileum, there were other similarly affected patches in the midst of the bed of nodular prominences, which gradually grew less numerous until at last they ceased altogether. None of these bodies were discovered in the jejunum, duodenum or stomach. The valvulae conniventes were faintly developed in the upper half of the ileum, but wanting altogether in the lower half. The congestion of the mucous membrane of the ileum was confined to the smaller vessels, being arboriform, ramiform or retiform, but nowhere uniform, maculiform, or punctiform. Similar congestions existed in the large intestine, jejunum, duodenum and stomach. The kidneys were both deeply congested, being of a dark purple colour.

CASE 5.

CHOLERA, COLLAPSE, DEATH IN 10 HOURS.

Congestion of the intestines and kidneys; enlargement of the spleen; liver, heart, and lungs unaffected; gall-bladder shrunk and empty.

Shaik Caboo, aged thirty years, a Mahomedan servant, was admitted into my ward at 2 P.M., on the 11th November, 1865, ill with purging, vomiting, and cramps only since 1 P.M.

He was very restless; had a great thirst; almost imperceptible pulse; sunken eyes; cold extremities; and severe cramps in the calves of the legs.

He was ordered ginger friction; a mustard plaster to the epigastrium; stimulant mixture \mathfrak{z} i every half hour; brandy and ice; and hot sago.

At 9 P.M. he had no pulse at the wrist; had two stools; vomited once; passed no urine; complained of a severe pain across the chest; had no cramps now; the extremities, tongue, and breath were all very cold.

At 11 P.M. he was dead.

Post Mortem Examination ten hours after death. Cadaveric rigidity more marked in the upper than the lower limbs. The whole of the intestines were of a rose-red colour and uniformly congested on the mucous surface; the mucous membrane of the stomach was of natural appearance. The liver was of normal size, shape, and hue, yielding on section a small quantity of blood; the gall-bladder was shrunk and empty. The spleen was considerably enlarged and hard. The kidneys were of natural size but congested. The heart and lungs were apparently healthy.

CASE 6.

CHOLERA, COLLAPSE, DEATH IN 11 HOURS.

Congestion of the intestines, gangrene of both lungs.

Dhunno, aged twenty-four years, an unemployed Hindu, was admitted into my ward at 10 A.M., on the 11th June,

1866, ill with purging and vomiting since the morning, and very low.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; brandy and ice; and sago diet.

At 11 A.M. he had a very copious vomiting, after which he had no pulse.

At 3 P.M. he had vomited twice more; was very cold; had great difficulty of breathing; no pulse.

At 4½ P.M. he was gasping for breath.

At 5½ P.M. he was dead.

Post Mortem Examination sixteen hours after death. The whole of the lower lobe of the left lung and a portion of the upper lobe were gangrenous; the right lung, too, was gangrenous. The intestines were slightly congested here and there. The liver, spleen, and kidneys were healthy.

CASE 7.

CHOLERA, COLLAPSE, DEATH IN 13½ HOURS.

Congestion of the lungs, kidneys, and intestines; thick treacly blood in the right ventricle of the heart and small branches of the pulmonary artery; desquamation of the renal epithelium; spleen of usual size with its capsule shrunk and corrugated; liver natural.

Jadu, aged seventeen years, a Hindu shop-keeper, was admitted into my ward at 12 P.M., on the 16th June, 1866, ill with purging and vomiting since 6½ in the morning; had passed five stools, and vomited five or six times.

His eyes were sunk; voice husky; pulse absent at the wrist; body cold; restlessness very great; thirst unquenchable; cramps severe. He was ordered stimulant mixture \mathfrak{z} i every quarter hour; ginger friction; Gallic acid mixture one dose; brandy and ice occasionally; milk and sago.

At 3 P.M. he had passed two stools and vomited once; had made no urine; his body was quite cold; pulse absent; respiration fair.

He was ordered chalk mixture \mathfrak{z} i every two hours; a mustard plaster to the epigastrium.

At 6 P.M. no stool; no urine; vomited once; pulse still absent; body cold; dyspnœa distressing.

He died at 8 P.M.

Post Mortem appearances as detailed in the summary.

CASE 8.

CHOLERA, COLLAPSE, DEATH IN 15 HOURS.

Congestion of the intestines and kidneys.

Holodhur, aged thirteen years, a Hindu labourer driven into town by the *Famine*, was admitted into my ward at 7 P.M., on the 8th July, 1866, ill with purging and vomiting since 8 o'clock in the morning. He had had four stools, vomited once, and had not made urine only since 3 P.M.

He was greatly prostrated; his body was icy cold; breath cold; pulse very feeble; respiration rather difficult; thirst great; mind quite clear

He was ordered stimulant mixture \mathfrak{z} ss every half hour; brandy and ice occasionally; and milk and sago diet.

At 10 P.M. he had had no stool; no urine; no vomiting; abdomen distended with flatus and very painful, so much so as to make him groan; pulse extremely small, feeble, and irregular; body cold as before. At 11 P.M. he was dead.

Post Mortem Examination ten hours after death, the ileum was slightly congested in patches; the mucous membrane of the jejunum was of a pale-rose colour throughout; of the large intestine also congested in patches. The kidneys were congested. The rest of the viscera were apparently healthy.

CASE 9.

CHOLERA, COLLAPSE, DEATH IN 15 HOURS.

Congestion of the intestines and most other viscera, except the heart and lungs.

Luchman, aged twenty-five years, a Hindu domestic, was admitted into my ward at 2½ P.M., on the 10th December, 1865, ill with purging, vomiting, cramps, and suppression of urine since the morning.

He was greatly prostrated; had a most urgent thirst; a very feeble pulse; sunken eyes; severe cramps; and an icy coldness of the body and breath.

He was given a dose of Tannic acid mixture, stimulant mixture ʒi every quarter hour; ginger friction; brandy and ice; sago diet.

At 5 P.M. he had had three stools more; but no vomiting.

At 9 P.M. another stool; and then he was dead.

Post Mortem appearances as in the summary.

The examination was made thirteen hours after death, the weather cold, and cadaveric rigidity more marked in the lower than the upper extremities.

CASE 10.

CHOLERA, COLLAPSE, DEATH IN 15½ HOURS.

Congestion of the intestines and kidneys.

Mahomed Shaik, aged twenty-six years, an unemployed Mahomedan, was admitted into my ward at 5½ P.M., on the 22nd August, 1865. He was ill with purging and vomiting since 12 o'clock noon; could not say how many motions he had had.

He was much prostrated; his eyes were sunk; pulse imperceptible at the wrist; tongue dry, covered with a whitish fur; body cold and clammy; thirst great; cramps violent; stools passing in the bed-clothes.

He was ordered Lead mixture \mathfrak{z} i every three hours; Ether mixture \mathfrak{z} i every quarter hour; brandy 1 measure; ice \mathfrak{z} lb.

At 10 P.M. he had had three stools; no vomiting; no urine; no pulse at the wrist; cramps very severe in the legs; thirst distressing.

Ginger friction was ordered to be applied to the extremities.

At 12 mid-night one stool; no vomiting; no urine; no pulse at the wrist; cramps better; respiration hurried.

At 3 A.M., on the 28rd, no stool; no vomiting; no urine; no pulse at the wrist; respiration more hurried and gasping.

Half an hour after this he was dead.

Post Mortem Examination five hours after death. Cadaveric rigidity full in all the extremities. On opening the abdomen nothing particular was observed. On opening the alimentary canal, the mucous membrane of the large intestine was found to be rose-coloured, that of the ileum and jejunum highly congested in an uniform manner, that of the duodenum and stomach healthy. Both kidneys congested; liver and spleen healthy.

CASE 11.

CHOLERA, COLLAPSE, DEATH IN ABOUT 16 HOURS.

Congestion of the stomach and intestines, and swelling of the Peyer's patches and solitary glands; congestion of the kidneys without desquamation of the renal epithelium; congestion of the lungs.

Dooty, aged twenty-two years, a Hindu maid-servant, was admitted into my ward at 1 P.M., on the 30th September, 1865, ill with purging, vomiting, and cramps since the latter part of the night. For two hours before admission the purging and vomiting had ceased.

She was dreadfully prostrated; with the eyes sunk; a great thirst; body cold; pulse almost imperceptible. She was ordered stimulant mixture \mathfrak{z} i every quarter hour; ginger friction; brandy and ice; sago diet.

At 4 P.M. she had had no return of vomiting or purging.

At 7 P.M. her breathing was difficult; coldness of the body increased; pulse absent.

At 9 P.M. she was dead.

Post Mortem Examination twelve hours after death. Weather hot and sultry; cadaveric rigidity more marked in the lower than the upper extremities. The mucous membrane of the large intestine throughout was found to be of a pale-rose colour, and occupied in the transverse and ascending colon and cæcum by numerous, prominent, solid, buff-coloured solitary follicles, mostly imbedded in a mesh-work of congested blood-vessels; the mucous membrane of the ileum, commencing from the cæcum for about four feet, was occupied by gradually more and more thickened Peyer's patches and solitary glands of the same character as in the large intestine; the mucous membrane of the rest of the small intestine and of the stomach was of a pale-rose hue.

The kidneys were scarlet-red, dry, and highly congested on section, but afforded no milky juice from the papillæ on pressure over the pyramidal portions.

The lungs also were congested.

CASE 12.

CHOLERA, COLLAPSE, DEATH IN 17 HOURS.

Congestion of intestines, spleen, and lungs; dark coagula in the ventricles of the heart; disorganization of both kidneys.

Lukhee Mony, aged twenty-five years, a Hindu labouring woman, was admitted into my ward at 9½ A.M., on the 15th August, 1865.

She was ill with purging and vomiting from 3 o'clock A.M. Had had three watery stools; vomited twice; passed urine twice.

She was very restless, and suffering from frequent and severe cramps in the lower extremities; her body was cold; pulse feeble; eyes sunk.

She was ordered Lead mixture \mathfrak{z} i every three hours; Ether mixture \mathfrak{z} i every quarter hour; ginger friction; brandy 2 measures; ice 1lb.; sago four times a day.

At 10 A.M. she had had one copious stool, $\frac{3}{4}$ gumlow-ful; no urine.

At 1 $\frac{1}{4}$ P.M. had another stool; no vomiting; no urine; was very thirsty.

At 6 P.M. no stool; no vomiting; no urine; pulse weak and irregular; thirst very great.

At 7 $\frac{1}{2}$ P.M. she was gasping for breath.

At 8 P.M. she was dead.

Post Mortem Examination twelve hours after death. Weather cloudy, extremities rigid. The mucous membrane of the large intestine was the seat of a rose-coloured uniform congestion. The kidneys were disorganized. The spleen was enlarged and congested. The liver was healthy. The ventricles of the heart contained dark coagula. The lungs were congested, and, on section, yielded frothy serum.

CASE 13.

CHOLERA, COLLAPSE, DEATH IN 17 $\frac{1}{2}$ HOURS.

Congestion of the small intestines, liver and kidneys only.

Kally Singh, aged thirty-two years, a Hindu durwan, was admitted into my ward at noon on the 22nd August, 1865. He was ill since the morning; had had three watery stools; but no vomiting.

He was healthy looking; his countenance was not affected; temperature at par; pulse distinct; tongue covered with a grayish fur; thirst great.

He was ordered Lead mixture \mathfrak{z} i every three hours; Ether mixture \mathfrak{z} i every two hours; ginger friction to the extremities; brandy and ice occasionally; milk and sago diet.

At 2 P.M. he had had three stools; no urine; no vomiting; his extremities were cold and suffering from cramps; pulse weak.

The Ether mixture was ordered to be given every quarter hour.

At 5 P.M. pulse barely perceptible at the wrist; body cold; eyes sunk; cramps severe; stools passing in the bed clothes; no urine; vomited once.

At 10 P.M. he was still passing stools in the bed clothes; vomited every time he took either medicine or water; had had no urine; pulse imperceptible at the wrist; respiration hurried. A Mustard plaster was ordered to the epigastrium. At 11 P.M. he was gasping for breath.

At 11½ P.M. he was dead.

Post Mortem Examination ten hours after death. Cadaveric rigidity more marked in the lower than the upper extremities. On opening the abdomen the peritoneum was found healthy; on cutting through the intestine a large quantity of opaque gelatinous fluid came out; large intestine healthy; mucous membrane of the small intestines rose-coloured, and their walls thin and transparent; stomach healthy; liver highly congested; gall-bladder collapsed; kidneys congested; spleen healthy; lungs collapsed; right ventricle of the heart contained some coagula of blood.

CASE 14.

CHOLERA, COLLAPSE, DEATH IN 18 HOURS.

Congestion of the intestines, other organs unaffected.

Sam Dass, aged twenty-two years, an unemployed Ooriah from the Famine districts, was admitted into my ward at 3½ P.M., on the 26th July, 1866.

He was ill with purging, vomiting, and cramps since the morning; had passed many watery stools; vomited several times; made no urine.

He was greatly prostrated; his eyes were sunk; countenance expressive of distress; thirst excessive; pulse barely perceptible at the wrist; temperature of the trunk almost natural; extremities icy cold; respiration difficult; cramps absent.

He was ordered stimulant mixture \mathfrak{z} i every quarter; chalk mixture \mathfrak{z} i every two hours; brandy 1 measure; ice 1lb.; milk and sago four times.

At 6 $\frac{1}{2}$ P.M. he had had one stool; no vomiting; no urine; was very thirsty and hungry; his pulse was barely perceptible at the wrist; extremities cold; respiration laboured; mind clear.

On the 27th, at 6 A.M., he was passing stools in the bed; had had no vomiting; no urine; the pulse was the same as at the last report.

At 11 A.M. he was still passing stools in the bed; very restless; tossing about his arms; his hands and feet were icy cold; pulse very feeble; epigastrium painful.

At 3 P.M. he still passed stools in the bed; was very restless; every now and then attempting to get out; had had no urine; his extremities were cold; pulse imperceptible.

At 6 P.M. he continued in the same state passing stools in the bed, without pulse, cold, and restless; his respiration was laboured; mind clear.

At 9 P.M. he was lying motionless and speechless; without a pulse; with the eyes turned up and fixed; breathing with a gurgle in the throat, and the mouth gaping; extremities icy cold; and without urine.

At 9 $\frac{1}{2}$ P.M. he was dead.

Post Mortem Examination about eleven hours after death. The mucous membrane of the large intestine was generally pale, but here and there congested in patches; the valvulae conniventes of the small intestine were deeply congested; the liver and spleen were of normal size and healthy; the gall-bladder was distended with bile; the kidneys were not much congested; the lungs were healthy; the walls of the right

ventricle of the heart were thicker than natural, and the cavity contained dark fluid blood.

CASE 15.

CHOLERA, COLLAPSE, DEATH IN ABOUT 19 HOURS.

Congestion of the stomach, intestines, liver, lungs and kidneys; desquamation of the renal epithelium; coagulated blood in the left, and fluid blood in the right ventricle of the heart.

Nobin Chunder Nundy, aged twenty-five years, an unemployed Hindu, was admitted into my ward at 1 p.m., on the 21th June, 1866, ill with purging, vomiting, and cramps since the previous evening. He had had seven stools; and vomited twice.

He was extremely prostrated; his pulse was barely perceptible at the wrist; trunk and extremities icy cold; eyes sunk; voice husky; thirst very great; muscles free from cramps; right side of the back very painful.

He was ordered stimulant mixture \mathfrak{z} i every half hour; a mustard plaster over the seat of pain; brandy and ice occasionally; milk and sago diet.

At 4½ p.m. he had had no stool; no urine; no vomiting; had a great thirst; was lying quiet; without a pulse; cold; and breathing with difficulty.

At 7½ p.m. he had had one stool; but no urine; no vomiting; no pulse at the wrist; his body was icy cold; voice reduced to a whisper; his respiration as before.

At 10 p.m. he was comatose; his respiration was laboured and frequent.

At twelve midnight he was dead.

Post Mortem Examination eight hours after death. The whole of the alimentary canal was of a pale-rose colour, the stomach presenting, besides, ecchymosed spots; the liver, lungs, and kidneys were all congested; pressure upon the pyramids of the divided kidneys expelled a milky fluid from the uriniferous tubes. Spleen rather small. The left ven-

tricle of the heart contained coagulated blood, the right fluid blood.

CASE 16.

CHOLERA, COLLAPSE, DEATH IN 23 HOURS.

Congestion of the lungs, liver, spleen, kidneys, intestines, and brain; Coagula in the cavities of both sides of the heart and intervening vessels.

Ozoodha, aged twenty-five years, a Hindu servant, was admitted into my ward at 6½ P.M. on the 30th August, 1861, ill with cholera for twelve hours.

He was in a state of collapse, and suffering from constant vomiting.

He was ordered a mustard plaster to the epigastrium Ether mixture ℥i every quarter hour, Lead mixture ℥i every two hours, and brandy and ice. Sago diet.

He died at 5½ A.M. on the 31st August.

Post Mortem Examination. The skin was waxy. The lungs were both bound down to the thoracic parietes by old pleuritic bands, and their substance congested. The blood in the veins was pitchy, sticky, coagulated, and deficient in serum. The blood in the vessels of the lungs was also coagulated and of a dark colour. A large quantity of black coagulated blood was found in the left chambers of the heart, more in the ventricle than the auricle; the coagula were small and soft. The right auricle was full of dark blood. The right ventricle also contained a large coagulum, loose in texture. The pulmonary artery was filled with a greyish fibrinous coagulum. The liver was congested, and on section full of dark blood. The gall-bladder was distended with fluid bile. The spleen was congested, enlarged and softened. The peritoneal cavity was dry. The intestines superficially congested, their mucous membrane of pale-rose colour. The substance of the kidneys was also congested, but no milky fluid exuded on pressure over the mammillary processes. The urinary bladder was spasmodically contracted, looking like the unimpregnated fundus uteri.

The sinuses of the dura-mater were gorged with blood. The vessels of the pia-mater turgid. And the substance of the brain congested.

CASE 17.

CHOLERA, COLLAPSE, DEATH IN 24 HOURS.

Congestion of the intestines, lungs, spleen, kidneys, and liver; desquamation of the renal epithelium; coagulated blood in both ventricles of the heart.

Bepinbehary, aged twenty-five years, a Hindu goldsmith, was admitted into my ward at 7½ P.M. on the 19th June, 1866, ill with purging and vomiting since 3 A.M. He had passed three stools; and vomited ten or twelve times; but had had no cramp or suppression of urine.

He stated that the day before the attack he had eaten a whole pineapple which had made him very uneasy and puffed up in the bowels.

He was very weak, and complained of pain in the abdomen; his pulse was small and weak; respiration natural; temperature fair.

He was ordered a mustard sinapism to the epigastrium, an ounce of chalk mixture with tincture opii m.x. immediately, stimulant mixture ℥i every two hours, milk and sago diet.

At 10½ P.M. he had had three stools; vomited four times; still complained of pain in the bowels; had a very feeble pulse; easy respiration; clear mind; and asserted that he had made urine twice.

On the 20th, at 5 A.M., he had had three or four stools; vomited twice; made no urine; complained of a good deal of thirst; his pulse was scarcely perceptible at the wrist, respiration difficult; temperature of the trunk low; extremities icy cold; eyes sunk and congested; mind slightly wandering.

The stimulant mixture was ordered every half hour; another mustard plaster to the epigastrium; chalk mixture \mathfrak{z} i every two hours; and beef-tea \mathcal{O} i was added to his diet.

At 11 A.M. he had vomited once again; was passing stools in the bed; very cold; and almost pulseless.

He was ordered some brandy and ice.

At 1 P.M. he was gasping for breath.

At 2½ P.M., he was dead.

Post Mortem Examination nineteen hours after death. The whole of the alimentary canal from the stomach to the large intestine was congested; the lungs were both irregularly congested, and, on section, yielded venous blood; the liver, spleen, and kidneys were smaller than usual, but congested; the substance of the kidneys was apparently healthy, but on pressure the uriniferous tubes afforded a milky fluid; the left ventricle of the heart contained a very small amount of coagulated blood, the right ventricle a large amount of the same kind of blood.

The brain was not examined.

CASE 18.

CHOLERA, COLLAPSE, DEATH IN 28 HOURS AFTER ADMISSION.

Congestion of the stomach, intestines, lungs, and kidneys; desquamation of the renal epithelium.

Wahirjaddy, aged forty years, a Mahomedan boatman, was admitted into my ward at 4½ P.M., on the 23rd June, 1866.

He was ill with purging and vomiting, he could not say how long.

His pulse was imperceptible at the wrist; body cold; respiration difficult; eyes congested; mind drowsy.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; milk and sago four times a day.

At 10 P.M. he had had no stool; no vomiting; no urine; was very restless; with no pulse at the wrist; extremities icy cold; respiration difficult. He was ordered brandy and ice occasionally.

On the 24th, at 6½ A.M., he had had three stools; no urine; no vomiting; no pulse; his body was cold; respiration difficult.

At 12 noon he was passing stools in the bed; had no pulse at the wrist; his body was icy cold; respiration very difficult; mind clouded; restlessness excessive.

He was ordered chalk mixture ℥i every two hours.

At 5½ P.M. he was worse. At 8 P.M. he was gasping for breath. Immediately afterwards he was dead.

Post Mortem Examination thirteen hours after death. The large intestine was congested in patches; the whole of the ileum was of a pale-rose colour; the stomach was somewhat congested; the liver was of natural size, its left lobe, which was united to the spleen by cellular bands, was subdivided into two lobules by a well-defined furrow in the longitudinal direction; the spleen was enlarged and hard; the lungs were congested; the right ventricle of the heart contained coagulated blood; the kidneys were of natural size, congested on section, and pressure on their pyramidal portions expelled a milky fluid from the uriniferous tubules.

CASE 19.

CHOLERA, COLLAPSE, DEATH IN 34 HOURS.

Congestion of the intestines, stomach, and lungs; atrophy of the spleen; desquamation of the renal epithelium; a small quantity of clotted blood in the left cavities of the heart; and a large amount of dark fluid blood in the right cavities.

Radhee, aged fifty, a Hindu beggar woman, was admitted into my ward on the 19th June, 1866. She was ill with purging since the morning; had passed three stools with urine; had had no vomiting or cramps.

She was much prostrated; her pulse was small and weak; eyes sunk; voice husky; respiration somewhat difficult; body cold; mind dullish.

She was ordered stimulant mixture \mathfrak{z} i every half hour, chalk mixture \mathfrak{z} i every four hours; brandy 1 measure; ice 1 lb.; sago diet.

At 11 A.M. she had had no stool; no vomiting; no urine; her pulse was very feeble; temperature low. At 1 P.M. she was passing stools in the bed; and yet she said she felt hungry.

At 4 P.M. passing stools in the bed; no vomiting; no urine; pulse barely perceptible at the wrist.

The stimulant mixture was ordered every quarter hour.

At 7 P.M. still passing stools in the bed; no vomiting; no urine; pulse as before.

A 10 P.M. four or five more stools; no urine; pulse hardly perceptible at the wrist.

On the 20th, at 5 A.M., three or four stools; no vomiting; no urine; no pulse at the wrist; extremities cold and clammy; respiration difficult.

At 11 A.M. she was worse. At $3\frac{1}{2}$ P.M. she was gasping for breath.

At $4\frac{1}{2}$ P.M. she was dead.

Post Mortem Examination seventeen hours after death. The whole of the large intestine was irregularly congested; the lower half of the ileum and the pyloric end of the stomach were also congested; the lungs had both collapsed, but the right one was somewhat congested; the spleen was remarkably atrophied, measuring only $2\frac{1}{2} \times 1\frac{1}{2}$ inches; the liver was small; the kidneys were also small, but on section and pressure upon the pyramids a milky fluid escaped from the uriniferous tubules; the left cavities of the heart contained a small amount of coagulated blood, the right cavities a large quantity of fluid venous blood.

CASE 20.

CHOLERA, (FOLLOWING FEVER,) COLLAPSE, DEATH IN 48 HOURS.

Internal organs mostly congested, three round worms in the intestines.

Gopaul Chunder, aged sixteen, a Hindu cook, was admitted into my ward at 5½ P.M., on the 13th June, 1865.

He had had fever three days before; was ill with purging, vomiting, and cramps since the morning of his admission; had already passed eight stools, and vomited once.

His strength was greatly prostrated; eyes sunk; temperature low; fingers shrivelled; thirst urgent; pulse extremely feeble but distinct; urine said to have been passed with the last stool on his way to the Hospital.

He was ordered the Ammonia mixture ℥i. every half hour, ginger friction, and some ice and brandy occasionally; sago diet.

On the 14th, at 5 A.M., he had had five or six stools; no vomiting; had made urine in small quantities with the motions; had no drowsiness or dyspnoea.

At 8 A.M. had had three more stools; no vomiting; made urine; skin cold; pulse barely perceptible; tongue clean and moist; thirst great; abdomen painful on pressure at the umbilicus; eyes slightly congested; respiration difficult; mind drowsy.

The stimulant mixture was ordered to be given every quarter hour.

At half past twelve he was groaning.

At 3 P.M. he had passed another stool; the stupor was increasing; and he resisted the administration of medicines.

At 4½ P.M. he swallowed a little "sago, and lay quiet, but cold, and evidently sinking.

At quarter to 11 P.M., his pulse was imperceptible at the wrist; eyes turned up; eyelids closed; mind unconscious.

In half an hour after this he was gasping for breath; and at 1 o'clock in the night he was dead.

Post Mortem Examination eight hours after death. Weather rainy, cadaveric rigidity none in the arms, but full in the legs. On opening the abdomen and taking out the intestines three round worms escaped from them; the mucous membrane of the large intestine was congested; in the cæcum and ascending colon, the scattered solitary glands appeared like little white prominences with their apices raised into minute transparent vesicles which in some places had burst; the small intestine was deeply and ramiformly congested for five feet in length from the cæcum, and its solitary glands and Peyer's patches were very prominent. The rest of this intestine was more or less congested; the stomach was deeply congested. The spleen was rather small but healthy; liver natural in size but congested; kidneys congested; their capsules readily separable from the subjacent structures.

CASE 21.*

CHOLERA, COLLAPSE, DEATH IN 45 HOURS.

Congestion of the intestines, desquamated epithelium in the uriferous tubes, fluid blood in the lungs and right cavities of the heart.

Reajooden, aged fifty years, a Mahomedan carpenter, was admitted into my ward at 2½ P.M., on the 21st June, 1866.

He was ill with purging, vomiting, and cramps since the previous evening; had passed many liquid stools and vomited frequently, but had made no urine.

He was very much prostrated; his pulse was small and weak; body cold.

He was ordered stimulant mixture ℥i every quarter hour; chalk mixture ℥i every hour; brandy 2 measures; ice ℥b.; sago four times.

At 6 P.M., he had had one stool; vomited once; had made no urine; his pulse was small and weak; body cold.

At 10 P.M., no stool; no urine; body cold; vomited twice; complained of pain in the belly.

On the 22nd, at 6 A.M., one stool; vomited once; made no urine; pulse very small and feeble; griping pain in the bowels; body cold.

At 1 P.M., two or three stools; no urine; no vomiting; pain in the abdomen very severe; pulse very feeble; intellect clear.

At 3 P.M., he was passing stools in the bed; had no pulse at the wrist; and was very restless.

At 3½ P.M., he was dead.

Post Mortem Examination eleven hours and a-half after death. The mucous membrane of the cæcum, and descending and transverse colon was congested; the lower half of the ileum was of a pale-rose colour; the rest of the intestines was healthy; spleen small and shrivelled; liver healthy; kidneys of usual size, their pelvis surrounded by an accumulation of fat, and pyramids on pressure yielded a milky fluid; lungs collapsed, emitted a gangrenous smell, and on section gave out fluid blood; the right ventricle of the heart contained fluid blood, the left ventricle was empty.

CASE 22.

CHOLERA, COLLAPSE, DEATH IN 45 HOURS.

Congestion of the intestines, lungs, brain, and kidneys.

Kartie, aged forty-five years, an unemployed Hindu, was admitted into my ward at 7 P.M., on the 19th September, 1866, ill with purging, vomiting, and cramps since 3 A.M. He had passed some thirty stools.

He was very much prostrated; had a scarcely perceptible pulse; a very low temperature; sunken eyes; a pain in the abdomen; a great thirst and a husky voice.

He was ordered stimulant mixture ʒi every quarter hour; ginger friction; brandy and ice; and sago diet. At 9 P.M.,

he had no pulse at the wrist; and his extremities were quite cold.

On the 20th, at 2 A.M., one stool; no urine; no vomiting. At 6 A.M., he was passing stools in the bed; but had no vomiting; no urine; no pulse; coldness increasing; no restlessness; no power to speak; respiration 32, labrrious; voice husky. He was ordered chalk mixture \mathfrak{ss} every three hours; and enemata of sugar of lead and water. At 12 noon he was still passing stools in the bed: had no pulse; was very cold; and breathing with difficulty.

At 3 P.M., no stools; no urine; no pulse; coldness and dyspnoea increasing.

At 6 P.M. no stool; no urine; no pulse; breathing difficult; mind drowsy.

At 9 P.M. he was worse. And at twelve midnight he was dead.

Post Mortem Examination eight hours after death. On opening the abdomen the ileum was found intussuscepted in two or three places, but the intussusceptions were evidently *post mortem* and not tight. The mucous membrane of the intestines generally was red. The lungs were congested, but no clots were met with in the branches of the pulmonary arteries. The heart contained some coagulated blood. The brain and the vessels of the piamater were congested. The kidneys were congested. But the liver appeared to be natural.

CASE 23.

CHOLERA; COLLAPSE, DEATH IN 53 HOURS.

Congestion of all the internal viscera, atrophy of the spleen, coagulated blood in the right ventricle of the heart.

Ramesur, aged forty years, a Hindu cook, was admitted into my ward on the 21st June, 1866. He was ill with purging and vomiting since the evening before; had passed altogether six stools, and vomited four times.

His pulse was very small and feeble at the wrist; body cold; extremities icy cold; fingers and toes shrivelled; he complained of a spasmodic pain at the lower part of the chest, and of severe cramps in the legs.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; ginger friction; brandy and ice; a mustard plaster to the epigastrium; milk and *sago*.

At 12 A.M., he had had no stools; no vomiting; no urine; his pulse was very weak; extremities cold; he still complained of pain in the chest.

At 2 P.M., he had had one stool; was otherwise as before.

At 4 P.M., two stools; no vomiting; no urine; pulse almost imperceptible at the wrist; body cold; mind clear.

At 6 P.M., six stools; otherwise as before.

At 10 $\frac{1}{2}$ P.M., four stools; still no urine; vomited once or twice; pulse almost imperceptible at the wrist; voice husky; restlessness very great.

On the 22nd, at 6 A.M., six stools; no urine; no vomiting; body cold; pulse as before.

Chalk mixture \mathfrak{z} i with tinct. opii M.V. every three hours.

At 1 P.M., four or five stools; no vomiting; no urine; pulse as before; body and extremities cold; cramps now and then; mind clear.

At 3 $\frac{1}{2}$ P.M., two stools; no urine; no vomiting; pulse very feeble; hiccup troublesome; respiration difficult; a mustard plaster was ordered to the epigastrium.

At 11 P.M., he was worse.

At 1 A.M., he was dead.

Post Mortem Examination eight hours after death. The stomach and the whole of the jejunum was of a pale-rose colour; the ileum and the large intestine were congested in irregular patches; the spleen was very much atrophied and red on section; the liver and the kidneys were of natural size, but congested; the gall-bladder was distended with bile; the

lungs were congested, their cut surfaces yielding on pressure venous blood; the right ventricle of the heart contained coagulated blood, the left ventricle was empty.

CASE 24.

CHOLERA, COLLAPSE, DEATH IN 4½ DAYS.

Congestion of the mucous membrane, and affection of the Peyer's patches and splanchnic glands of the intestines. Other organs not examined.

Dwarkanath, aged twenty-five years, a Hindu servant, was admitted into my ward at 8 A.M., on the 19th October, 1865, ill with cholera since the 16th of that month. The vomiting stopped towards the evening of the first day; but the purging and suppression of urine still continued.

His pulse was very feeble; extremities cold; eyes congested; bowels moved many times since the night; thirst very great; muscles free from cramps; voice husky.

He was ordered stimulant mixture ℥i every half hour; ginger friction; a mustard plaster to the epigastrium; brandy and ice; sugo four times a day.

At 4 P.M., he was passing stools in the bed; but had had no vomiting or urine; was very restless; his pulse was barely perceptible at the wrist; respiration difficult; eyes congested and turned upwards; and extremities cold.

At 5½ P.M., he was drowsy.

At 11 P.M., he was still drowsy, and had had no stool; in other respects as before. He was ordered a blister to the nape of the neck.

On the 20th at 7 A.M., he was still in the same state, but the respiration was more laboured.

At 1½ P.M., he was very restless and gasping for breath.

At 8½ P.M., he was dead.

Post Mortem Examination seventeen hours after death, weather cloudy, cadaveric rigidity present in all the extremities. On opening the abdomen the peritonæum was found dry and somewhat sticky. The mucous membrane of the large intestine was congested in a retiform manner and covered with ecchy-mosed patches, but had no ulcers, cicatrices or enlarged solitary follicles. The mucous membrane of the small intestines was of a rose-colour and covered with retiform and arboriform injections; in the lower third (ileum) the solitary glands and Peyer's patches were both enlarged and prominent; the other organs were not carefully examined.

CASE 25.

CHOLERA, COLLAPSE, DEATH IN 4½ DAYS.

Congestion of the intestines and kidneys, desquamation of the epithelium of the left kidney.

H. Logan, aged thirty-three years, an unemployed Englishman, was admitted into my ward on the 12th May, 1866, ill with purging and cramps since the morning.

He had passed three copious watery stools; had had no vomiting; was suffering severely from cramps; made urine with the motions; his pulse was small and feeble; body cold; voice husky.

He was ordered stimulant mixture ℥i every hour; brandy and ice occasionally; milk and sago four times.

At 12 A.M., one stool since admission; pulse weak; body cold.

At 2½ P.M. two stools; no vomiting; pulse barely perceptible at the wrist; body covered with a cold sweat; cramps severe in the legs; thirst small; voice very husky.

Stimulant mixture to be given every quarter hour; gallie acid mixture ℥i stat.; ginger friction; more brandy and ice.

At 5 P.M., he was worse; his respiration was difficult; prostration very great.

At 9½ P.M., no stool; no vomiting; no urine; pulse barely perceptible at the wrist; voice husky; extremities cold; respiration difficult; mind clear.

At 1 A.M., on the 13th, the pulse was imperceptible at the wrist; respiration laboured; no stool; no vomiting; no urine; body cold.

At 4½ A.M., four or five scanty stools; otherwise as before. Chalk mixture ℥i to be given after every stool.

At 5½ A.M., three or four stools more; no urine.

At 6½ A.M., one stool; no urine; no pulse; extremities cold and bedewed with perspiration; eyes sunken; mind clear.

At 8½ A.M., vomited once; no pulse; extremities cold and bedewed with perspiration.

At 10½ A.M., vomited again; otherwise as before.

At night no urine; complained of palpitation of the heart and a pain in the left hypochondrium; body cold; mind clear.

On the 14th, in the morning, no vomiting; no urine; one stool; hypogastrium tender and rather dull; respiration 40, difficult; pulse barely perceptible.

At 11½ A.M., no stool, urine, or vomiting; body and extremities icy cold and covered with a cold sweat; pulse very feeble at the wrist.

At 4 P.M., one stool; no vomiting; pulse extremely small and feeble; respiration laborious and hurried; he felt somewhat better.

At 7 P.M., two stools; no vomiting; no urine; body very cold.

At 12 midnight, much the same; respiration difficult.

On the 15th, at 3½ A.M., one stool. At 8½ A.M., 5 or 6 stools; said to have made a little urine.

At 11½ A.M., passing stools in the bed-clothes.

.At 6 P.M., he was gasping for breath. At 6½ P.M., he was dead.

Post Mortem Examination two hours after death. The mucous membrane of the large intestine was deeply congested and covered with a continuous layer of a granular material resembling in appearance the compound sulphur ointment; the lower part of the ileum was also somewhat congested, its remainder, jejunum and duodenum healthy; the cardiac end of the stomach was covered with punctiform injections. Kidneys larger than natural; left kidney of a dark purple colour, its capsule thick but removable without tearing the renal substance, fracture regular, surface mottled purple and light yellow, proportion of cortical and medullary parts much altered, the former considerably more abundant than usual and granular in appearance. On pressing the pyramids a little milky fluid escaped from the papillae. Right kidney even more deeply congested than the left, its capsule separated without tearing the substance, surface deep purple, fracture irregular, proportion between cortical and pyramidal portions not much altered, the tubular structure of a deep purple colour and oily-looking, on pressing the pyramids scarcely any milky fluid escaped from the papillae.

The lungs were tied down by old adhesions, anæmic on the anterior surface, congested posteriorly.

Heart of natural size and healthy.

CASE 26.

CHOLERA, COLLAPSE, DEATH IN 6 DAYS.

Congestion of the intestines and kidneys, tumors on the tongue-shaped left lobe of the Liver, gall-bladder full of bile.

Biki Maji, aged 18 years, an unemployed Hindu, was admitted into my ward on the 1st August, 1865.

He was ill for five days with purging and vomiting. He was very weak; his countenance was depressed; eyes sunk; pulse imperceptible at the wrist; extremities cold; voice low; stools numerous and scanty; vomiting frequent. He was

ordered Rum mixture \mathfrak{z} i every four hours, stimulant mixture \mathfrak{z} i every quarter hour, a mustard plaster to the epigastrium, ginger friction, ice, milk and sago diet.

. At 8 P.M., he complained of pain in the abdomen, which was ordered to be fomented.

On the 2nd, in the morning, he had had no stool; no urine; no vomiting; no pulse; his extremities were cold; respiration hurried. Mustard sinapisms were ordered to be applied to the chest and loins.

At 10 A.M., he was gasping for breath. In half an hour more he was dead.

Post Mortem Examination nineteen hours after death. Weather fair; extremities rigid; on laying open the abdomen nothing peculiar was observable; on cutting through the intestines, the cæcum was found to be the seat of retiform congestion; the rest of the large intestine was not congested; the ileum was slightly congested, but not so the jejunum, duodenum, or stomach. The left lobe of the liver jutted out like a tongue and at its base contained a tumor of the size of a pigeon's egg, looking on section like a lymphatic gland; about an inch and a half further on were found two more tumors of the same size, and a few smaller ones. The right lobe was smaller and rounder, but on section appeared to be soft; the gall-bladder was distended with bile. The kidneys were both of a dark purple colour; on section the inter-pyramidal and cortical portions appeared to be in excess over the pyramidal or striated. The spleen was small and thin.

CASE 27.

CHOLERA, PULMONARY EMBOLISM, DEATH IN 14 HOURS.

Congestion of the intestines, kidneys, lungs and liver; a large fibrinous coagulum in the right ventricle of the heart; and desquamation of the renal epithelium.

Kany Lal Bose,* aged sixteen years, a Hindu shop-keeper, was admitted into my ward at 10 P.M., on the 21st June, 1866.

He was ill with purging and vomiting from that evening; had passed altogether six watery stools, and vomited thrice.

His pulse was imperceptible at the wrist; body cold and bathed with perspiration; voice husky.

He was ordered a dose of tannic acid mixture; stimulant mixture $\frac{3i$ every quarter hour; ginger friction to the surface; brandy 1 measure, and ice lib; milk and sago diet.

On the 22nd at 6 A.M., he had had four stools; no vomiting; no urine; suffered from griping pains in the night, but not then; his pulse was perceptible at the wrist, but small and weak; body cold; respiration difficult; mind quite unconscious.

At 8 A.M., he was dead.

Post Mortem Examination two hours after death. The whole of the alimentary canal from the stomach to the rectum was of a pale-rose colour; the kidneys were small but congested, and, on section, the divided surfaces were full of blood, and the pyramids on pressure gave exit to a milky fluid; the liver was greatly congested and the branches of the portal vein were full of a thick dark blood; the lungs were deeply congested, and, on section, the branches of the pulmonary artery were found full of thick dark blood; the left ventricle of the heart was empty, the right ventricle contained a large fibrinous coagulum.

CASE 28.

CHOLERA, PULMONARY EMBOLISM, DEATH IN 30 HOURS.

Bright's disease of the kidneys, vesicular affection of the solitary glands and Peyer's patches, fibrinous coagula in the right cavities of the heart, thick black blood in the pulmonary artery, Emphysema of the lungs.

Abraham, aged thirty years, a Mahomedan policeman, was admitted into my ward on the morning of the 16th October, 1866.

He was ill since daylight; had passed five copious watery stools; vomited once; he said that he had had a free discharge of urine with the stools. He had had no griping, straining or cramps.

His strength was much prostrated; eyes sunk and injected; body warm; pulse very low; respiration good; thirst very considerable; voice very feeble; mind drowsy.

He was ordered stimulant mixture and chalk mixture; brandy and ice; sago four times, beef tea Oi.

At 12 noon, he had had two or three stools since admission; no vomiting; made urine freely; his warmth was natural; pulse barely perceptible at the wrist.

At 3 P.M., he was passing stools in bed; had not vomited; made urine again freely; had no pulse at the wrist; temperature of the trunk and extremities was normal; countenance sunk; voice husky.

At 6 P.M., no stool since last report; vomited once; pulse just the same.

At 9 P.M., two stools; no vomiting; extremities cold; pulse absent at the wrist; voice husky; thirst unquenchable.

At 12 o'clock midnight he was much the same as at 9 P.M.

On the 17th, at 3 A.M., he was still passing stools in bed; had vomited twice; pulse at the wrist absent; temperature of the body considerably below par.

At 6 A.M., he had had four stools; vomited twice; pulse imperceptible at the wrist; extremities cold; countenance sunk; voice husky; thirst insatiable; restlessness very great; respiration 28, difficult.

At 11 A.M., two stools; no vomiting; no urine; he was apparently sleeping. At 2 P.M., two stools; no vomiting; no urine; body cold and clammy; voice husky.

He was ordered hot sago, brandy one measure, ice 2lbs.

At 6½ P.M., he felt better; had had two stools; no vomiting; no urine; voice still husky; pulse said to have been felt

at the wrist; temperature better; thirst still troublesome; respiration laborious.

At 10½ P.M., two stools; no vomiting; no urine; pulse doubtful at the wrist; voice low and broken; body cold; extremities icy cold; respiration gasping.

At 11½ P.M., he was dead.

Post Mortem Examination 9 hours after death; weather hot; cadaveric rigidity still present in the extremities. On opening the abdomen the peritoneum was found to be somewhat oily and adhesive. Spleen of usual size; its capsule shrivelled, opaque and thicker than natural; its interior firm. Kidneys both smaller than natural, one of them having two cysts full of urine on the convex margin; section congested; cortical substance small; pyramidal, had the striae greatly reduced, texture granular, with large openings leading into veins, pelvis opaque, pressure upon the pyramids forced out a little milky fluid from the organ which had no cysts; lungs of usual size but very emphysematous, the air-cells standing out like a crop of sudamina from their surface; the right one was covered posteriorly with a dense false membrane over the upper lobe; left one ecchymosed; on section a good deal of dark tarry blood flowed out from the larger branches of the pulmonary artery; on division of the pulmonary artery near the heart, thick dark fluid blood escaped from it; the right ventricle of the heart contained similar blood and some pale fibrinous coagula interlaced with the columnæ carneæ; the pulmonary valves were healthy; the right auricle contained a large fibrinous coagulum filling its cavity; the left ventricle was almost empty except near the aortic orifice where it contained a few small dark coagula; left auricle empty; aorta empty; liver smaller than natural; portal vein dry; its branches contained dark tarry blood; hepatic vein and its branches both dry; the divided surface of the liver was more yellow than pink. On opening the skull a little dark tarry blood flowed out; on cutting through the meninges the surface of the brain appeared as if it were macerated in water; the amount of fluid was small; there was no particular fulness of the vessels of the pia-mater; the surface of the convolutions was bathed in water, and a little fluid escaped; on slicing the substance of the cerebrum

there were found only a few points of dark blood oozing out; the ventricles of the brain were dry; the choroid plexuses and velum interpositum rather pale; the texture of the cerebral substance was firm. The cerebellum presented similar appearances. The mucous membrane of the colon was of a light pinkish colour and covered with retiform injection; of the ileum, for about three feet, congested, the first two feet being vivid red; the Peyer's patches in this space and for a little further on were unduly prominent; they seemed to be composed of light coloured meshes enclosing in the centre transparent specks, evidently vesicles, the whole examined by a magnifying glass having a honey-combed appearance; further on the solitary glands were more affected than the Peyer's patches, and of a light colour; this continued throughout the whole length of the ileum; not so the congestion; the mucous membrane of the rest of the small intestines was pale and presented nothing unusual.

CASE. 29.

CHOLERA, COLLAPSE, PULMONARY CONGESTION AND EMBOLISM,
DEATH IN 27½ HOURS.

Congestion of the Alimentary canal from the stomach to the rectum, of the brain, liver and lungs; clots in the right cavities of the heart, pulmonary artery, and right lung; prominence of the solitary glands; union of the kidneys into one in the horse-shoe-form malformation; shrivelling of the spleen.

Shoaggy, aged thirty-five years, an unemployed Hindu female, was admitted into my ward on the morning of the 15th November, 1866, ill with cholera since seven o'clock of the previous evening. She had had many stools; vomited twice; made no urine; was suffering from cramps in the extremities; excessive thirst; great loss of temperature; and prostration, the voice being husky, and the pulse absent from the wrist, while the restlessness was very great.

She was ordered stimulant mixture ℥i every half hour; chalk mixture ℥i every two hours; brandy and ice occasionally; hot sago diet.

At 12 noon, no stool; no vomiting; no urine; no pulse; extremities very cold; thirst considerable; pain on pressure all over the abdomen; voice low; mind rational.

At 1½ P.M., no stool; no urine; vomited once; was very uneasy; had no pulse at the wrist, but excessive thirst.

At 4 P.M., no stool; no urine; no vomiting; no pulse; no cramps; restlessness and thirst greatly increased. Half an hour after this she was moaning; her respiration was laboured; mind clear; extremities cold; and there was no pulse, stool, or vomiting.

At 9½ P.M., she was worse; and at 10½ P.M., she was dead.

Post Mortem Examination 11 hours after death; weather dry and cold; cadaveric rigidity present in all the extremities, less in the upper than the lower.

Section of the body dry; muscles red; peritoneum dry, sticky and more vascular than usual. Urinary bladder so shrunk that its position was actually difficult to find. Abdominal vena cava full of thick black tarry blood. Kidneys joined into one across the spinal column, forming a regular horse-shoe. On removing from the chest the heart and lungs, and placing them on the table a good quantity of treacle-like blood flowed out of the divided vessels. The lungs were both naturally collapsed, free from adhesions, and more or less red on the surface. On section, the substance in both appeared congested, and their vessels black and distended with blood, which was very thick and treacle-like, but not coagulated in the left lung, coagulated and blocking up their channels in the right. The right ventricle of the heart contained a fibrinous clot, which, in one direction, extended into the right auricle, in the other, followed the pulmonary artery holding open the semilunar valves and abruptly terminating about half an inch beyond the bifurcation. The left ventricle was empty except at the commencement of the Aorta which contained a dark coagulum.

The liver was of small size, mottled on the surface, but more livid than yellow; on section the hepatic veins were found full of dark blood. The gall-bladder was small and moderately filled with bile. The spleen was shrivelled.

On opening the skull, the dura-mater was found to be dry, the vessels of the pia-mater appearing through it full and dark. The cavity of the arachnoid was natural; the glandulæ Pacchionæ on the borders of the longitudinal fissure also natural. On peeling off the visceral layers of the meninges, the surface of the brain was found wet as it were with water. On slicing the substance both the gray and the white matters appeared to be congested and firm. The lateral ventricles were empty. The Alimentary canal from the stomach to the rectum was of a pale-rose colour and contained fifteen live round worms; in the ileum the solitary glands were enlarged, swollen, prominent and filled with a light-coloured substance, without any corresponding affection of the Peyer's patches; the solitary glands were also affected in the large intestine, though to a less extent.

CASE 30.

CHOLERA, PULMONARY CONGESTION AND EMBOLISM, DEATH IN

30 HOURS.

Serous effusion on the brain; congestion of both lungs, clots in the smaller branches of the pulmonary artery in the upper lobe of the left; a fibrinous clot extending from the right auricle to the roots of the lungs; congestion, granular degeneration, and epithelial desquamation of the kidneys; spleen shrivelled; liver hepatically congested; gall-bladder moderately full; urinary bladder shrunk and containing a milky fluid; intestines throughout congested, presenting in the colon dark patches, in the ileum enlarged solitary glands and Peyer's patches.

Florian Fernandes, aged 30 years, a dark Portuguese cook, was admitted into my ward at 1½ P.M. on the 6th November, 1886, ill with cholera since the morning.

He had passed many watery stools, but had not vomited nor made urine; his countenance was depressed; eyes sunk; pulse absent at the wrist; temperature of the trunk fair, of the extremities low; voice husky; thirst considerable; restlessness very great.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour, chalk mixture \mathfrak{z} i every hour; brandy and ice occasionally; hot sago diet.

At 4 P.M., he had had two stools; vomited twice; made no urine; his pulse was still absent at the wrist; skin perspiring profusely; extremities cold. A mustard plaster was ordered to the epigastrium. At 11 P.M., he had had no stools; vomited once; made no urine; his body was icy cold; eyeballs turned up and injected; pulse, temperature and voice as before; respiration 30; thirst great; mind clear; muscles free from cramps. The chalk mixture to be given every three hours.

At 6 A.M., on the 7th, one stool; no vomiting; no urine; still no pulse at the wrist; respiration 40; body warm; extremities cold; thirst great; tongue dry, covered with a grey fur; percussion note of the hypogastric region clear; mind clear.

At 8½ A.M., the pulse was flickering at the wrist; extremities icy cold; body a little warmer, but still colder than natural; skin dry; respiration difficult; muscles free from cramps; took his medicines regularly. At 11 A.M., he was passing stools frequently in the bed; had had no vomiting or urine; extremities icy cold; restlessness very great; fingers bent with cramps; respiration gasping.

At 12 noon he was dead.

Post Mortem Examination 21 hours after death; weather dry and cold; cadaveric rigidity very little in the arms, full in the legs; on opening the skull and tearing the membranes a good deal of clear fluid mixed with blood escaped into the *gumlow*; on removing the brain with the membranes the whole thing appeared as if it were macerated in water; the vessels of the pia-mater were pale and shrunk; the sinuses of the dura-mater were empty; the surface of the brain was quite wet; on section of the substance the white matter appeared more congested than the grey; the choroid plexuses were pale; the lateral ventricles contained a small amount of serum.

The lungs were moderately expanded and congested in appearance; the right lung, on section, appeared bright red and gave exit to a bloody serosity, its larger vessels contained no blood-clots; the left lung on section seemed to be hepatized in the upper lobe, with thick dark pitchy

blood issuing from some of the divided veins, while from others there were found hanging out black linear blood-clots; in the lower lobe the hepatization was greater, colour of a deeper purple, the fluid discharged from the divided vessels black blood, from the bronchial tubes a frothy liquid; no blood-clots anywhere.

The right ventricle of the heart contained a little dark fluid blood and a pale fibrinous coagulum which in one direction extended into the right auricle, but in the other into the pulmonary artery as far as the interior of the lungs and held open the semilunar valves.

The kidneys were of the usual size, rather flabby and deep purple externally; the right kidney was light purple on section, more granular than natural, with the cortical and interpyramidal substances larger in proportion to the pyramidal,—the striæ of the latter being invisible and their aspect oily; on pressure a milky fluid escaped from the uriniferous tubes; the left kidney, on section, was more bloody than the right; the congestion of its substance was so deep as scarcely to leave any distinction between cortical and pyramidal; on pressure a milky fluid escaped from the tubuli uriniferi. The spleen was a little smaller than usual and pale, with its capsule shrivelled, and substance on section dry and yielding no pulp.

The liver was of the usual size, of a hepatic colour externally and also on section, yielding fluid blood from the divided hepatic veins, none from the portal channels; gall-bladder moderately filled with bile.

The urinary bladder was very much shrunk, and on section found to contain in its interior a milky fluid.

The mucous membrane of the intestines generally was of a pale rose colour, in the colon presenting numerous black patches, of the size of kidney-beans, which, on section of the mucous membrane, were found to be due to blackened and dead cellular tissue; in the ileum, the solitary glands and Peyer's patches enlarged, prominent and filled with a light coloured substance, extending the whole length of the tube, the solitary glands being at first densely set, and then becoming more and more separated the further they were from the ileocolic junction.

CASE 31.

CHOLERA, PULMONARY CONGESTION, DEATH IN 40 HOURS.

Intestines, liver, spleen, kidneys and lungs congested; 8 live round worms in the bowels; heart not examined.

Daroo Bowah, aged fifty years, a Hindu maid servant, was admitted into my ward early in the morning on the 8th August, 1865.

She was ill with purging and vomiting since the night before, had passed many watery stools and vomited twice.

She was ordered lead mixture \mathfrak{z} i every two hours; ether mixture \mathfrak{z} i every quarter hour, ginger friction to the extremities, brandy one measure, ice 1lb; milk and sago diet.

At 11 A.M., she was much prostrated; her countenance was depressed; pulse barely perceptible at the wrist; body cold; thirst great; restlessness considerable; stools three, passed in the bed; no urine; no vomiting.

At 5 P.M., she had had three stools; no vomiting; no urine; her pulse was absent at the wrist; body cold.

At 6 P.M., three more stools; no pulse; no urine; vomited once; skin cold.

At 2 A.M., on the 9th, her body was cold; extremities icy cold; lower limbs suffering from cramps; thirst and restlessness intense; stools numerous; she had vomited twice; passed no urine.

At 5 A.M., three more stools; no pulse at the wrist; no vomiting; no urine; cramps less severe.

At 8 A.M., she had passed more watery stools in the bed-clothes; complained of pain in the bowels; had not passed urine; her voice was very low; radial pulse absent as before.

She was ordered enemata of sugar of lead and decoction of Babul bark.

At 2 P.M., stools still passing in the bed-clothes; no urine; body cold. The lead mixture was omitted. A mustard plaster was applied to the loins.

At 7 P.M., she felt a little better; the pulse had returned, though it was still very feeble; she had had no stool or vomiting since last report; but had not made urine yet.

At 11 P.M., she had not had any return of purging or vomiting; the pulse was barely perceptible; body cold; urine not secreted yet.

At 1 A.M., on the 10th, the pulse had again disappeared from the wrist; the body was colder; respiration hurried.

She was ordered ammonia mixture \mathfrak{z} i every quarter hour.

1½ A.M., she was gasping for breath.

At 2-10 A.M., she was dead.

Post Mortem Examination seven hours after death, weather sultry, cadaveric rigidity more marked in the lower than the upper extremities. On opening the alimentary canal, the mucous membrane of the large intestine was found congested in a ramiform manner, but had nothing else particular; the mucous membrane of the small intestine was also congested, the congestion in some places being uniform, in some arboriform, and in others retiform; eight round worms escaped from the interior of this gut. The liver, spleen, kidneys and lungs were all congested.

CASE 32.

CHOLERA, PERSISTENT VOMITING, PULMONARY CONGESTION,
DEATH IN 4 DAYS.

Intense Congestion of both lungs; inflammation of the large intestine, ileum and lower portion of the jejunum; atrophy of the spleen.

Salamut, aged twenty-eight years, an unemployed Mahomedan, was admitted into my ward on the 10th February, 1862, ill with cholera since the day previous. He had had much purging and vomiting, slight cramps, and some urine.

His eyes were sunk; voice low; pulse very weak at the wrist; thirst considerable; extremities cold. He was ordered stimulant mixture \mathfrak{z} i every hour, and low diet. Friction with ginger powder.

On the 11th at 7 A.M., he had had five or six stools; vomited four or five times; was suffering very much from cramps and severe thirst; passed urine once; his body was of ordinary temperature, and pulse filiform.

In the afternoon his pulse at the wrist was very feeble; body of almost natural temperature; abdomen slightly gurgling; and tongue covered with a gray fur.

The medicines were still continued; but milk was allowed with the sago.

On the 12th, his bowels had not been moved; he had vomited twice; passed urine two or three times; was still thirsty; had a weak pulse; but fair heat of skin.

The medicines were all omitted.

On the 18th, he had had no stool; passed urine two or three times; vomited six or seven times; but had no thirst; the body was of ordinary temperature; pulse weak.

He was allowed milk and rice.

At 1 P.M., he was suffering from great difficulty of breathing; his countenance was anxious; pulse very feeble; mind rather drowsy; body restless.

He was ordered stimulant mixture \mathfrak{z} i every half hour.

At 6 $\frac{1}{2}$ P.M., he was dead.

Post Mortem Examination. The left lung was adherent to the parietes; but both this and the right lung were red and deeply congested. The whole of the mucous membrane of the lower half of the jejunum, ileum and large intestine was in a state of inflammation, being of a uniformly deep purple colour and covered with masses of inflammatory exudation. The spleen seemed to be very small. There was nothing particular about the other organs.

CASE 33.

CHOLERA, EXHAUSTION, DEATH IN 6½ DAYS.

Congestion of the intestines, spleen, liver, and kidneys; desquamation of the renal epithelium; prominence of the solitary glands; clots in the heart and pulmonary artery.

Goopee, aged twenty-eight years, a Hindu weaver, from the famine district, was admitted into my ward about 2 P.M., on the 16th June, 1866.

He was ill with purging and vomiting for three days. He was greatly prostrated; his eyes were sunk; temperature of the trunk a little below par, extremities colder; pulse fair; voice husky.

He was ordered stimulant mixture ℥i every half hour; chalk mixture ℥i every four hours; brandy 1 measure, ice 1lb.; milk and sago.

At 6 P.M., he had had three stools; no vomiting; no urine; his pulse was distinct, but frequent and small; respiration difficult; body cold; thirst urgent.

At 9½ P.M., four stools; no urine; no vomiting; pulse feeble and small.

On the 17th, at 2 A.M., no stool; no vomiting; no urine; pulse very small and weak.

At 5½ A.M., no stool; vomited twice; made urine once; the temperature of the body was good; the difficulty of breathing continued.

At 12 A.M., he had had many stools; but no urine or vomiting; the pulse was again small and weak; extremities cold; respiration difficult; mind clear.

At 6 P.M., two stools; made urine once; pulse as at last report.

At 10 P.M., no stool; no vomiting; no urine; pulse and temperature as before; mind perfectly clear.

On the 18th, at 1 A.M., three stools; otherwise as before.

At 6 A.M., two stools; made urine; respiration, pulse, temperature, and mind as before.

He was ordered chalk mixture \mathfrak{z} i every three hours, milk diet with fish, and port wine 2 measures.

At 12 A.M., no stool; no vomiting; no urine; respiration hurried; pulse fair; thirst great.

At 2 P.M., one stool; otherwise as before.

At 7 P.M., one stool; no urine; no vomiting; body cold; respiration frequent and difficult; pulse very small and feeble.

At 10 P.M., one stool; otherwise as before.

On the 19th, at 6 A.M., pulse very feeble and small; temperature low; respiration difficult; mind dull; urine said to have been passed twice; stools in the bed.

The stimulant mixture to be given every quarter hour

At 11 A.M., two stools; fingers and toes cold and shrivelled; pulse very feeble; respiration difficult.

At 1 P.M., he had no pulse. At $1\frac{1}{4}$ P.M., he was dead.

Post Mortem Examination nine hours after death. Liver, spleen and kidneys congested; gall-bladder full; the tubules of the kidneys on pressure yielded a white milky juice; the mucous membrane of the ileum and large intestine was of a pale-rose colour; the solitary glands were prominent; the pericardium contained about half an ounce of fluid; clots were found in both the ventricles and the pulmonary artery; the lungs were good.

CASE 34.

CHOLERA, EXHAUSTION, DEATH IN 11 DAYS.

Congestion of the intestines, and of the other organs.

Shibee, aged thirty-five years, a Hindu maidservant, was admitted into my ward at 2 P.M., on the 4th November, 1865; ill with cholera for three days.

She had had two stools since the morning; vomited once; passed urine; had a good temperature and feeble pulse.

She was ordered stimulant mixture \mathfrak{z} i every three hours, and a mustard plaster to the epigastrium; milk and sago diet.

She continued to have several stools a day, passed her urine and had a good temperature till the 10th, when she suddenly got worse, and her extremities became cold, breathing difficult, and manner restless.

The stimulant mixture was ordered every quarter hour.

On the 11th, her body was overspread with an eruption of lichen, and the urine arrested.

On the 12th, the urine had to be withdrawn by the catheter, the vomiting returned, but there was no stool. She died about 7 A.M.

The *Post Mortem Examination* revealed the state of the organs as stated in the summary.

CASE 35.

CHOLERA, EXHAUSTION, DEATH IN 12 DAYS AND 18 HOURS.

Congestion of the intestines, and partial hepatization of the right lung; other organs said to have been healthy.

Shoomottee, aged thirty years, an unemployed Hindu female, was admitted into my ward on the 3rd July, 1866, ill with cholera since 4 A.M. She had passed three watery stools, and vomited once. Her pulse was small and weak; extremities cold; thirst great; respiration difficult; urine suppressed.

She was ordered stimulant mixture \mathfrak{z} i every hour; chalk mixture \mathfrak{z} i every three hours; brandy and ice occasionally; milk and sago diet. •

The secretion of urine returned after twenty-four hours; the vomiting ceased; the temperature improved; the mind remained clear; the pulse was weak and small; respiration

more or less difficult; but the purging continued unchecked, till at last she passed her stools involuntarily in the bed, and died thoroughly exhausted.

Post Mortem Examination nine hours after death. The mucous membrane of the small intestines was here and there congested, of the large uniformly congested from the cæcum to the rectum without any ulceration. The right lung was adherent to the parietes by old false membranes, and slightly hepatized, yielding on section a frothy serum; the left lung was healthy. The liver, spleen, and kidneys were all healthy. The heart was of usual size, with a thick deposit of fat on the anterior surface of the right ventricle; the valves were all good. There was no fluid in the pericardium. The brain was not examined.

CASE 36.

CHOLERA, SECONDARY DIARRHŒA, EXHAUSTION, DEATH IN 5 DAYS AND 16 HOURS.

Congestion of the intestines, lungs, and other viscera; effusion of serum in the subarachnoid space.

Gonesh, aged eighteen years, a Hindu policeman, was admitted into my ward at 9 A.M., on the 10th December, 1865, ill since the morning with purging, vomiting, and cramps.

He had had altogether about seven or eight stools; vomited once; and passed no urine since the onset.

He was very much prostrated; getting occasional cramps; suffering from severe thirst; had a small pulse; with the respiration tranquil; and extremities cold.

He was ordered a dose of tannic acid mixture; stimulant mixture \mathfrak{ss} every quarter hour; ginger friction; brandy and ice occasionally; and sago diet.

At 2 P.M., two stools; pulse imperceptible at the wrist; thirst very great.

He was ordered lead mixture \mathfrak{ss} every three hours.

At 9 P.M., no stool ; no vomiting ; no urine ; pulse returned, but low.

On the 11th in the morning, he had made urine, but complained of severe cramps in the fingers.

The lead mixture was omitted.

Stimulant mixture \mathfrak{z} i to be given every hour.

At 11½ A.M., one stool ; urine once ; no vomiting ; pulse better ; body warmer.

At 8 P.M., one stool ; once urine ; pulse weak.

On the 12th, at 8 A.M., three stools ; urine with every stool ; extremities warm ; pulse weak ; vomiting ; pain in the abdomen.

The stimulant mixture was omitted.

He was ordered chalk mixture \mathfrak{z} i every four hours ; a mustard plaster to the abdomen ; and a pint of beef-tea in addition to former diet.

At 2 P.M., five or six stools ; urine free ; pulse good ; no vomiting.

On the 13th in the morning, many stools ; urine free. The chalk mixture was omitted.

He was ordered Pulv. Kino c. Opio \mathfrak{z} i thrice a day ; turpentine fomentation to the abdomen.

At 1½ P.M., many stools ; urine free.

At 9 P.M., seven or eight stools ; urine free.

At 5 A.M., on the 14th, much in the same state. The powder was ordered to be given every four hours.

On the 15th in the morning, two stools ; urine free ; pulse very feeble.

At 9 P.M., no pulse at the wrist ; extremities cold ; respiration hurried ; mind unconscious.

At 9½ P.M., he was gasping for breath. At 10 P.M., he was dead.

Post Mortem appearances as in the summary.

CASE 37.

CHOLERA, SECONDARY DIARRHŒA, EXHAUSTION, DEATH IN 9 DAYS AND 18 HOURS.

Congestion of the large intestine, desquamated epithelium in the uriniferous tubes.

Ramjoy, aged forty-eight years, an unemployed Hindu, was admitted into my ward at 5 P.M., on the 31st July, 1866.

He was ill with purging and vomiting since the evening before; had passed altogether eleven stools, and vomited thrice; had not passed urine since day-light; was not gripped.

He was very thirsty, and suffering from severe cramps; his pulse was barely perceptible at the wrist; body cold; eyes sunk; pupils dilated; voice low; respiration good; mind clear.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; chalk mixture \mathfrak{z} i every half hour; ginger friction; brandy 1 measure, ice 1lb, milk and sage, beef-tea Oi.

At 9 P.M., he had had no stool; his pulse was scarcely perceptible at the wrist; skin covered with perspiration.

At 11½ P.M., no stool; extremities very cold; pulse the same as at last report.

On the 1st August, at 5½ A.M., he had had no stool; no vomiting; his pulse was distinct but feeble and small; skin clammy.

At 8 A.M., he had not passed urine; his respiration was easy; hypogastrium slightly full.

The stimulant mixture was continued every half hour, and chalk mixture every two hours; otherwise as before.

At 11½ A.M., he had had no stool, but passed some urine; had had no vomiting.

At 5½ P.M., he had had two stools; made urine; and his pulse, respiration, and temperature were good.

At 12 midnight, he had had five stools; made urine thrice; had not vomited; complained of a pain in the loins; the pulse was fair; and he felt better.

On the 2nd, he had five stools; made urine scantily; had no vomiting; his pulse was very small and weak; respiration somewhat difficult and hurried; temperature below par; mind clear; sleep unsound.

On the 3rd, he had ten stools; made urine scantily.

On the 4th, seven stools; urine free; pulse good; no vomiting.

On the 5th, one stool; urine free; pulse tranquil.

On the 6th, two stools; urine free; weakness still great.

He was ordered rum mixture in lieu of former medicines.

On the 7th, he was very drowsy; dribbled a good deal of urine; had had no stool; bladder greatly distended and dull; a catheter brought away about a pint of urine.

At 3 P.M., the urine was again drawn off; no stool.

On the 8th, no stool; urine good; weakness continued.

He was given a cathartic enema, and full diet with milk Oii.

On the 9th, the urine was drawn off; he had had four stools; got very low and died at noon.

Post Mortem Examination. The lower part of the large intestine was uniformly congested; small intestine bile-stained; spleen and liver small; kidneys apparently healthy, exuding, however, on pressure a milky fluid from the apices of the pyramids; lungs and heart good.

CASE 38.

CHOLERA, SECONDARY DIARRHŒA, EXHAUSTION, DEATH IN ABOUT 15 DAYS.

Congestion of the ileum, colon, stomach, lungs, spleen, liver, and kidneys; desquamation of the renal epithelium; black blood in the right ventricle of the heart; brain not examined.

Dudeah, aged eighteen years, an Oorjah from the famine district, was admitted into my ward at 10½ P.M., on the 9th August, 1866, ill with cholera since the morning.

He had had ten watery stools; his voice was husky; pulse very small and weak; extremities cold.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; chalk mixture \mathfrak{z} i every four hours; brandy and ice occasionally; sago diet.

On the 10th, at 4 A.M., he had had no stool; vomited once; made urine; his pulse was small and weak; extremities cold; voice low.

At 6 A.M., no stool; no urine; no vomiting; pulse stronger though small.

At 8 A.M., pulse as before; respirations twenty; temperature of the trunk almost natural, of the extremities a little lower.

The stimulant mixture was ordered to be given every hour, and port wine in place of brandy.

At 12 noon, no stools; no urine; no vomiting; no restlessness; temperature as before.

At 5½ P.M., two stools; no urine; no vomiting; respiration a little laboured; mind drowsy; pulse good.

A blister was ordered to the nape of the neck.

At 9 P.M., one stool; no urine; no vomiting; otherwise as before.

At 12 midnight, two stools; no urine; no vomiting; extremities cold.

On the 11th, at 6 A.M., two stools; no urine; no vomiting; pulse, respiration, and animal heat tolerably good.

Two pints of beef-tea were added to his diet.

At 5 P.M., no stool; said he had passed urine; was sleeping.

At 12 midnight, one stool; no vomiting; no urine.

On the 12th, at 6 A.M., no stool; no vomiting; no urine; pulse and temperature natural.

At 2 P.M., one stool; vomited once; no urine; pulse fair.

At 6½ P.M., one stool; no vomiting; no urine; pulse feeble.

At 11 P.M., very thirsty; no stool, otherwise as before.

On the 13th, at 3 A.M., two stools; passed water with the stools.

At noon, no stool; no urine; very thirsty; abdomen painful on pressure; pulse low.

At 6½ P.M., one stool; made urine once; temperature good; mind clear; pulse weak.

At 9½ P.M., sleeping; no stool, vomiting, or urine; respiration and pulse good.

On the 14th, at 5 A.M., one stool; no vomiting; urine free; otherwise as before.

At 8½ A.M., still very weak.

At 12 noon, no stool; urine twice; no vomiting; pulse and temperature good; felt very weak.

At 2 P.M., one stool; no vomiting; urine once.

At 12 midnight, one stool; has been sleeping a good deal.

On the 15th, at 6 A.M., two stools; passed urine.

At 5 P.M., one stool; urine free.

At midnight, much the same.

On the 16th, at 6 A.M. five stools; made urine; slept well; no vomiting; pulse weak; extremities cold.

A drachm of tincture of kino was ordered to be added to the chalk mixture.

On the 17th in the morning, he had had five stools.

At 4½ P.M., four stools; made water with the stools.

On the 18th, at 7 A.M., he had had eighteen stools, liquid, faeculent, yellow, yielding on washing no sediment.

His former medicines were omitted.

He was ordered Pulv. Kino c. Opio gr. xx every 4 hours.

At 5 P.M., his bladder was distended with urine, a pint of which was drawn off by the catheter.

On the 19th the urine was again drawn off; he had five or six stools in the bed.

The stimulant mixture was again given every two hours.

On the 20th, he had nine stools, and passed urine with them; his pulse was small and weak; temperature lower than before.

On the 21st five stools, fæculent, brown, floating on urine; teeth and lips covered with sordes; pulse very small and weak.

On the 22nd, three or four stools in the bed; urine also in the bed; emaciation considerable; pulse seventy-six, weak; prostration very great; tongue dryish, slightly rough, but clean. He was allowed milk and sago morning and evening, fish, port wine 4 measures; beef-tea 2 pints.

On the 23rd in the morning, three stools, brownish, liquid, fæculent, yielding on washing bits of fæces; lips and teeth covered with sordes; tongue moist, but rather rough; pulse very feeble; extremities cold; about six ounces of urine drawn off by the catheter.

At 11 A.M., he was lying on his back in a state of stupor with the left leg flexed; unable to speak or swallow; pupils dilated; no pulse at the wrist; body cold; respiration oppressed. It appeared that he had been passing some stools in the bed.

At 12 noon, he was dead.

Post Mortem Examination twenty-one hours after death. The ileum was highly congested; large intestines also more or less congested; stomach slightly congested; lungs, liver, spleen, and kidneys congested; on dividing the kidneys, they both yielded on pressure a milky fluid from the uriniferous tubes. The right ventricle of the heart was full of black blood; the left ventricle was empty. The head was not examined.

CASE 39.

CHOLERA, SECONDARY DIARRHŒA, EXHAUSTION, DEATH IN 15 DAYS.

Deep congestion of the intestines ; distension of the gall-bladder with bile.

Durjon, aged thirty-five years, a Hindu coolie, was admitted into my ward on the 24th March, 1866, with a cholera of five days' standing. He was passing four or five stools a day, and had made no urine since the attack.

He was ordered stimulant mixture \mathfrak{z} i every half hour, a mustard plaster to the loins, and milk and sago diet.

At 6 P.M., he had had three scanty stools, but still no urine.

The former medicine was omitted.

He was ordered gin mixture \mathfrak{z} i every three hours, another mustard plaster to the loins, and brandy and ice.

On the 25th, at 6 A.M., he said that he had made urine once during the night ; his pulse was weak ; temperature fair.

During the rest of that day he had two stools ; made water several times freely ; but the pulse was still very small and weak ; and voice low and husky.

He was allowed milk diet and fish.

On the 26th, he had only one stool ; made urine freely ; but the pulse was weaker ; temperature lower than natural ; and respiration difficult.

On the 27th, he had no stool ; in other respects he was the same as before.

On the 28th, he had one stool ; and free discharge of urine.

On the 29th, the urine had to be drawn off by the catheter ; the pulse was very low ; voice very low ; mind drowsy ; bowels moved once ; extremities cold ; difficulty of breathing increased. -

On the 30th, the *corneae were laxy*; there was a *sore on the left elbow*; coldness of the body increased; considerable restlessness.

A poultice was ordered to the sore; port wine and broth added to the diet.

On the 31st, he passed five stools in the day, and in the bed in the night; and was still further prostrated. Fish omitted;

On the 1st April, he was still passing stools in the bed, had scarcely a pulse; and could not swallow medicine or food.

On the 2nd, he was worse, and died at 4 P.M.

Post Mortem Examination eighteen hours after death. Both the large and small intestines were dilated and contracted alternately in many places, especially in the jejunum where the calibre was reduced in some places to the size of a swan-quill; their mucous membrane was throughout congested, in many spots approaching to something like sphacelation. The gall-bladder was considerably distended with green bile.

CASE 40

CHOLERA, DELIRIUM, EXHAUSTION, DEATH IN 3 DAYS.

Fulness of the superficial veins and choroid plexuses, and congestion of the substance of the brain. Congestion of the peritoneum, omentum, stomach, small intestines, and kidneys.

Charles Mulvarry, aged twenty-five years, an American seaman, was admitted into my ward on the 16th November, 1860, ill with cholera for three hours.

He was attacked at three o'clock that morning with purging and vomiting; had had numerous stools, and vomited many times since.

His pulse was just perceptible at the wrist, skin cold and perspired a good deal; extremities affected with violent cramps; fingers blue and shrivelled; urine stopped.

He was ordered lead mixture \mathfrak{z} i every hour; Ether mixture \mathfrak{z} i every half hour.

At 9 A.M., there was no pulse at the wrist. The skin all over the body blue and cold; face bedewed with drops of cold perspiration; extremities cold; great pain in the back; jactitation; constant groaning; respirations forty-four, difficult; tongue cold; legs affected with cramps; purging and vomiting stopped since admission.

The former medicines were omitted.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour, ginger friction, brandy and ice, hot water-bottles to the feet and arm-pits, sago diet.

At 5 P.M., three stools; vomited thrice; passed urine; cramps less severe than before; extremities cold and clammy; pulse becoming slightly perceptible at the wrist; fingers shrivelled; thirst considerable; vomited while under examination.

On the 17th in the morning, it was reported he had had ten motions during the night; passed urine; felt better; tongue more natural; pulse perceptible at the wrist; skin of the hands still cold and shrivelled.

He was allowed arrow-root and chicken-broth.

At 9 P.M., he had had six motions; vomited several times; passed no urine; pulse absent at the wrist; extremities cold and clammy; fingers shrivelled; thirst considerable; vomited brandy and water whenever administered.

On 18th in the morning, he looked very much better; had had no stools in the night; but vomited frequently. He was ordered a mustard plaster to the epigastrium, and spirits of nitric ether m. xx. with camphor water every four hours. Brandy and ice continued as before.

At 4 P.M., the purging and vomiting had returned as before. He was very restless; had made water; had no pulse.

At midnight, he was very troublesome, restless, quite delirious, and violent. Cold application was ordered to the head.

On the 19th, at 2 A.M., he was dead.

Post Mortem Examination seven hours after death. Cadaveric rigidity full. The superficial veins of the brain and choroid plexuses were gorged with blood; the substance of the brain was congested but not softened; there was no effusion into the ventricles.

The lungs were healthy. The cavities of the heart contained both coagulated and fluid blood. The peritoneum and omentum were congested. The pancreas, duodenum, and other adjacent parts tinged yellow with bile, which had transuded from the gall-bladder without any rupture of its walls or of its duct. The inner surface of the pyloric end of the stomach was uniformly congested throughout, the cardiac end only in patches. The mucus membrane of the small intestines was rather congested. The urinary bladder was collapsed. The kidneys were both congested. The liver and spleen appeared to be natural.

CASE 41.

CHOLERA, URÆMIC COMA, DEATH IN 69 HOURS.

Kidneys both granular, the pelvis of one of them contained a stone, intestines congested.

Joyram Dass, aged forty-five years, an unemployed Hindu, was admitted into my Ward at noon, on the 15th July, 1865.

He was ill with purging from midnight, and with cramps and vomiting from 6 A.M.; had had four copious watery stools; vomited four times.

He was much prostrated; his pulse was scarcely perceptible at the wrist; eyes sunken; temperature of the body lower than natural; thirst considerable; cramps severe; he had no hiccup.

He was ordered stimulant mixture \mathfrak{z} i every half hour.

R. Acid. Tannic. gr. x.

„ Sulphur. dil. m. x.

Tinct. Opii m. x.

Aquæ Camphor. \mathfrak{z} i

M. ft. haust, to be taken every two hours, ginger friction to the extremities, turpentine fomentation to the abdomen, brandy 1 measure, ice 1lb., sago diet.

. At 4 P.M., he had had two scanty stools; no urine; vomited once.

On the 16th, he had had four watery stools at night; no urine; vomited thrice; his strength was much prostrated; pulse scarcely perceptible at the wrist; tongue moist and covered with a greyish fur; thirst increased; extremities cold; respiration somewhat accelerated.

The tannic acid mixture was omitted; the rest of the treatment was continued. A mustard plaster was ordered to be applied to the epigastrium; milk was added to the diet.

At 3½ P.M., he had had no vomiting; no urine; the pulse was feeble; extremities cold; and he had passed two stools.

At 6½ and 8½ P.M., the reports were the same as to vomiting and urine; but he had also had no stool; and was getting restless.

On the 17th in the morning, no stool; no vomiting; no urine; pulse imperceptible at the wrist; tongue covered with a greyish fur; extremities cold; respiration very difficult; he was getting hiccup now and then; a catheter passed into the bladder drew off 1 oz. of urine; his mind was quite unconscious now.

At 9½ A.M., he was dead.

Post Mortem Examination twenty-four hours after death. The viscera generally were more or less decomposed. A good deal of oily substance was found floating on the surface of the peritoneal fluid; the mucous membrane of the large intestine was generally congested, mostly in a retiform manner, in some places ecchymosed; the ileum was congested; both the kidneys were granular, one of them containing, besides, a stone in its pelvis.

CASE 42.

CHOLERA, URÆMIC COMA, DEATH IN 86½ HOURS.

Congestion of the intestines, kidneys, brain, lungs and liver; desquamation of the renal epithelium; serous effusion into the ventricles of the brain; coagula of blood in both ventricles of the heart.

Saleh, aged twenty-three years, a Mahomedan khalasee, was admitted into my ward at 6 A.M., on the 19th August, 1866, ill with purging and vomiting since ten o'clock in the night. He had passed four stools and vomited as often.

He was greatly prostrated; his temperature was throughout low, especially in the extremities; pulse imperceptible; voice husky; thirst great; chest painful; mind clear; bowels not moved for two hours.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; a mustard plaster to the epigastrium; brandy and ice occasionally; sago four times a day.

At 11 A.M., no stool; no vomiting; no urine; pulse barely perceptible; face bedewed with perspiration; thirst very great; temperature low.

At 1 P.M., same as at last report; no urine.

At 3 P.M., two stools; respiration slightly difficult; no urine.

At 6 P.M., two stools; no urine.

At 11 P.M., two stools; no urine; great restlessness.

On the 20th, at 5½ A.M., two stools; no urine; no vomiting; no pulse; restlessness very great. He was given calomel gr. xx.

At 7½ A.M., he was better than the day before; had a small and weak pulse; skin slightly cold and bathed with perspiration, which on the forehead had gathered in drops; respirations thirty-two; mind clear; no cramps; no jactitation; thirst still inordinate.

At 7½ P.M., no pulse at the wrist; extremities icy cold; restlessness very great; respiration laboured; temperature low; mind clear; two or three stools; no urine.

He was given another twenty-grain dose of calomel.

At 11 P.M., he was passing stools in the bed; had had no vomiting; no urine; pulse feeble.

On the 21st, at 3 A.M., no stool; had made urine once (?); no vomiting; pulse feeble; restlessness very great.

At 5½ A.M., he was still very restless; had had no more stool, vomiting, or urine; his pulse was feeble; temperature low.

He was given a ten-grain dose of calomel.

At 7½ A.M., he was passing stools constantly; had no pulse at the wrist; made no urine; his skin was cold and clammy; voice low.

At 9 A.M., he winced on pressure over the hypogastric region; the temperature of his trunk was natural, of the hands a little below natural; no pulse; respiration thirty; complexion pretty good, except of the hands; mind clear; tongue clean; but there was a slight tendency to drowsiness.

At 11½ A.M., no stool; no vomiting; no urine; no pulse; skin clammy; restlessness very great.

At 2 P.M., he was very restless.

At 5 P.M., he was moaning; winced on pressure over the hypogastric region; was very drowsy; had had no stool or urine; his respiration was very laborious; and he refused to take any more medicines.

At 9 P.M., no stool; no urine; no pulse; on the whole worse.

On the 22nd, at 6 A.M., no stool; no urine; no vomiting; no pulse; extremities and trunk cold; skin moist; hypogastrium clear, but on percussion over it he started up with pain; eyes turned up; respiration very difficult, thirty-two in a minute; mind in a state of stupor.

At 11 A.M., he was worse. At 20 minutes to 12, he was gasping for breath.

At half past twelve, he was dead.

Post Mortem Examination eight hours after death. Both the lungs were congested, giving out a black blood on section. The right ventricle of the heart was full of coagula; the left ventricle contained one soft coagulum. Both the kidneys were congested, and the uriniferous tubes yielded a milky fluid on pressure. The intestines were throughout highly congested. The substance of the brain was slightly congested, and its ventricles full of serum. The liver was congested, and the gall-bladder distended with bile.

CASE 43.

CHOLERA, URÆMIC COMA, DEATH IN 5 DAYS.

Congestion of the intestines, liver, and lungs; dark fluid blood in the right ventricle of the heart; kidneys and brain not examined.

Nundolal, aged seventy years, a Hindu beggar, was admitted into my ward at 12 noon on the 19th June, 1866.

He was ill with purging and cramps, without vomiting, for two days previous to his admission; had made water several times during that period. He was very low; his eyes were sunk in their sockets; pulse feeble; thirst unquenchable; body cold; extremities icy cold; fingers and toes shrivelled and blue; cramps absent for the time.

He was ordered stimulant mixture \mathfrak{z} i every quarter of an hour; brandy and ice occasionally; milk and sago four times.

At 7 P.M., he had seven stools; no vomiting; passed urine with the motions; his pulse was feeble; temperature low.

He was ordered chalk mixture \mathfrak{z} i every two hours.

At 11 P.M., he had had three stools; was otherwise as before.

On the 20th, at 8 P.M., he had had three stools; no vomiting; made water once; his pulse was small and feeble; and he complained of a pain all over the chest.

He was allowed milk diet and fish.

At 11 A.M., he had had one stool in the bed; no urine; no vomiting; his pulse was small and weak; temperature lower than par.

At 4 P.M., one stool; no vomiting; urine once; pulse and temperature as before.

At 10 P.M., two stools; felt some nausea.

On the 21st, at 3 A.M., two stools; made water twice; temperature good; pulse small and weak.

At 6½ A.M., one stool; urine once; no vomiting; temperature low; pulse very small and weak; respiration difficult; thirst very great.

His former medicines were omitted. He was ordered rum mixture ʒi every hour; milk diet and beef-tea.

At 12 noon, two stools; no vomiting; urine twice; voice low and husky; pulse and temperature as before.

At 2 P.M., mind delirious; otherwise as before.

At 4 P.M., mind drowsy; no stool; no urine; no vomiting; extremities cold; pulse weaker.

At 6 P.M., no stool; stupor increasing.

At 10½ P.M., mind comatose; stools passing in the bed; no urine; no vomiting; respiration difficult; pulse barely perceptible.

At 2-10 A.M., he was gasping for breath. At 2½ A.M., he was dead.

Post Mortem Examination. The cæcum was deeply congested; colon and ileum congested in patches; jejunum of a pale rose-colour; liver and lungs very much congested, the cut surfaces of the latter yielding on pressure a frothy serum; right ventricle of the heart contained venous blood, left ventricle was empty.

CASE 44.

CHOLERA, URÆMIC COMA, DEATH IN 5 DAYS AND 10 HOURS.

Congestion of the lungs, brain, kidneys, and liver ; round worms in the intestines and ductus communis choledochus ; fatty degeneration and epithelial desquamation of the kidneys.

Odinath, aged twenty-five years, a Hindu labourer, was admitted into my ward at 10½ A.M., on the 12th April, 1866.

He was ill with purging and vomiting since the previous morning; had passed many stools and vomited incessantly from the commencement of the attack; had made urine; and voided his last motion about an hour before his admission.

His eyes were sunk; body cold; pulse very small and feeble; thirst unquenchable; and while under examination, he passed a large watery stool which contained a round worm.

He was ordered tannic acid mixture, two doses; stimulant mixture ʒi every half hour; brandy 1 measure; ice 1lb; milk and sago four times a day.

At 2½ P.M., he had had two stools; no vomiting; no urine; and complained of a pain in the abdomen; his pulse was as before.

He was ordered a mustard plaster to the region of the stomach.

At 5 P.M., no stool; no urine; very restless and thirsty.

At 12 midnight, no stool; no urine; restlessness, thirst, and coldness as before; pulse very weak.

On the 13th, at 8 A.M., no stool; no urine; vomited once; forehead covered with perspiration; surface of the body very cold; thirst very great; pulse very small and feeble.

At 12 A.M., pulse barely perceptible at the wrist; extremities cold; perspiration very copious; no stool; no urine; vomited several times; complained of pain in the epigastrium.

At 5 P.M., he was in the same state.

At 12 midnight, no stool; no vomiting; no urine; otherwise as before.

On the 14th in the morning, no stool; passed two drops of urine; pulse regular but weak, eighty-four; respiration twenty-two; no appetite; thirst less.

On the 15th, one stool; urine free; no vomiting; pulse very small and weak; trunk warmer; extremities still cold.

He was allowed milk diet and fish.

On the 16th in the morning, no stool; no vomiting; made urine in the night, not since; was delirious till the morning; eyes somewhat congested; restlessness very great; respirations forty, difficult; body cold and moist; pulse very feeble; did not reply to questions; was now in a state of stupor; hypogastrium dull, 4 oz. of urine drawn off by the catheter; percussion note of the chest rather dull; respiratory murmurs harsh and rather weak.

A blister was ordered to the nape of the neck; stimulant mixture continued; he was to take calomel gr. ii., sodæ carbonat. gr. ii., every four hours; and for diet milk and sago four times a day.

At 12 noon, he had no pulse; was cold and comatose, and breathing with great difficulty.

At four P. M., he was gasping for breath.

At 4½ P.M., he was dead.

Post Mortem Examination sixteen hours after death. The posterior parts of the lungs were congested, and on section yielded fluid blood; the meninges of the brain were congested; the substance of the cerebral hemispheres also congested; the ventricles of the heart contained a dark fluid blood; kidneys both a good deal congested and flaccid, their cortical substance fatty, and the uriniferous tubules yielded an opaque milky fluid on pressure over the papillæ; the intestines contained a great number of large round worms, one of which had made its way into the ductus communis choledochus; substance of the liver of a livid colour from congestion of the hepatic veins; gall-bladder full of bile; spleen of natural size.

CASE 45.

CHOLERA, URÆMIC COMA, DEATH IN 6 DAYS.

Bright's disease of the kidneys, atrophy, pigmentary degeneration, and adhesion of the great omentum.

William Harrison, aged twenty-eight years, an English seaman, was admitted into my ward at 7 A.M. on the 14th May, 1864.

He was seized with cholera about 4 P.M. the day before without any previous illness.

At the commencement of the seizure he passed many loose stools without vomiting or cramps; but about 8 o'clock of the morning of his admission he got suddenly worse, and began to have now frequent large watery stools, violent vomiting, and severe cramps.

He was greatly prostrated; his pulse, though very feeble, was yet distinct; his extremities were cold and livid; eyes sunken; limbs suffering from severe cramps; thirst very great; voice husky; urine had not passed since 4 A.M.; last stool passed at 6 A.M.

He was ordered ether mixture \mathfrak{z} i every half hour, sugar of lead and babul enemata, and brandy and ice occasionally. Sago diet.

At 4 P.M., he had had five or six stools; vomited three or four times; was getting occasional cramps; the pulse was still distinct; but there had been no discharge of urine.

At 9 P.M., he had had another stool, but no vomiting; the pulse was feeble.

On the 15th in the morning, he had had three scanty stools, but no urine; no vomiting; the pulse was distinct.

His former medicines were omitted. He was ordered gin mixture \mathfrak{z} i every two hours, milk and sago, and chicken broth Oi.

At 4 P.M., no urine still; no stool; vomited once. Fomentation was ordered to be applied to his loins.

On the 16th in the morning, he had had three stools, scanty, fæculent, yellowish; vomited several times in the night, a mouthful at a time; passed urine freely; was perspiring during the visit.

The gin mixture was omitted. He was ordered chalk mixture $\mathfrak{z}\text{i}$ every four hours, milk diet, and ice.

The vomiting continued through that day; he passed five stools more; urine less freely than in the morning; and his pulse remained weak.

He was ordered a mustard plaster to the epigastrium, and 1 measure of port wine.

On the 17th in the morning, he had had three or four stools; vomited three or four times; had made urine; and was quite sensible.

Aromatic spirit of ammonia $\mathfrak{z}\text{ss}$. was ordered to be added to each dose of the chalk mixture, the port wine was increased to 2 measures, and he was allowed chicken broth and sago for diet, and ice 2 pounds.

At 3 P.M., he had had five or six stools; vomited three or four times; the pulse was feeble but distinct; no urine since the morning.

A mustard plaster was applied to the epigastrium.

A sugar of lead and decoction of babul enema at once.

At 9 P.M., he had had two more stools, but no vomiting.

On the 18th in the morning, he had had two or three stools; no vomiting; made urine once; pulse as before.

The medicines were continued. For diet he was allowed milk and sago four times; beef-tea $\mathcal{O}\text{i}$, port wine and ice as before.

At 4 P.M., he had had one stool; no vomiting; no urine; an inclination to drowsiness; pulse weak.

At 4 A.M., on the 19th no stool; no vomiting; no urine; pulse weak; he was at times speaking foolishly.

At 9 A.M., the drowsiness continued, but there was no delirium; the respiration was hurried and difficult; no more stools. His medicines were omitted. His head was ordered to be shaved and blistered.

At 11 A.M., his breathing was stertorous; eyes open but fixed; pulse barely perceptible at the wrist; he appeared to be quite insensible, and made no answer when spoken to.

At 4½ P.M., he was gasping for breath.

At 5½ P.M., he was dead.

Post Mortem Examination sixteen hours after death. On opening the body, the great omentum was found thin, without fat, and dark-coloured, resembling a lady's black veil; a process of it was found attached, opposite to the right crural ring, to the peritoneal surface of the bladder, dipping down to it, without entering the crural canal. The kidneys were enlarged and congested; the apices of their pyramids, being pressed, yielded a whitish looking fluid, which, under the microscope, presented epithelial corpuscles, but no casts of any kind.

The liver also was enlarged.

CASE 46.

CHOLERA, URÆMIC COMA, DEATH IN 6 DAYS AND 9 HOURS.

Congestion of the intestines, kidneys, lungs and meninges of the brain; desquamation of the renal epithelium; clots of fibrin and blood in the ventricles of the heart; serous effusion into the ventricles of the cerebrum.

Bunnyram, aged twenty-two years, a Hindu hut-builder, was admitted into my ward at 4½ P.M. on the 5th May, 1866, ill with purging, vomiting, and cramps since 9 A.M. He had had six copious watery stools; vomited twice; and the cramps in the calves were very severe.

He had no pulse at the wrist; his body was icy cold; eyes sunk; voice very low; fingers shrivelled, blue, and bang with spasms; calves still suffering from cramps; respiration laborious; thirst urgent; restlessness very great.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour; chalk mixture \mathfrak{z} i every three hours; brandy and ice occasionally; sago diet.

At 7 P.M., he had had six stools; vomited five or six times; passed no urine; with the body icy cold; no pulse at the wrist; great restlessness; respiration laborious.

On the 6th, at 1 A.M., two scanty stools; no vomiting; no urine; no pulse; voice husky; extremities cold and clammy; respiration rather difficult; abdomen distended and tympanitic; mind obscure; body cold.

At 5½ A.M., two stools; vomited thrice; no urine; pulse perceptible at the wrist; voice still husky; temperature low; respiration easier; mind clearer.

At 11 A.M., one stool; no vomiting; no urine; thirst great; pulse feeble; respiration good; mind clear.

At 5½ P.M., no stool; no vomiting; no urine; pulse small and feeble; respiration natural; mind clear.

A mustard plaster was ordered to the loins.

At 8 P.M., two stools; vomited once; no urine; respiration somewhat difficult; mind clear; pulse small and feeble; extremities cold.

A mustard plaster was ordered to the epigastrium.

At 10 P.M., one stool; vomited once on taking medicine; no urine; pulse very small and feeble; thirst bad.

On the 7th, at 5½ A.M., four or five stools in the bed; vomited three or four times; passed no urine; skin cold; pulse absent at the wrist; thirst bad; mind clear.

At twelve mid-day four or five stools; no urine; pulse small and feeble; body warmer; mind clear.

At 2 P.M., two stools; no urine; temperature better; respiration slightly difficult.

At 7 P.M., one stool; no urine; otherwise as before.

At 9 P.M., no stool; no vomiting; no urine; pulse small and weak; temperature good; mind clear.

At 12 midnight, three stools; no urine; otherwise as before.

On the 8th, at 8 A.M., three stools; no urine; no vomiting.

At 5½ A.M., two stools; no vomiting; no urine; body of ordinary temperature; pulse good; mind drowsy.

A blister was ordered to the nape of the neck.

At 12 noon, no stool; no vomiting; no cramps; no urine; drowsiness increasing.

At 5½ P.M., no stool; no vomiting; no urine; pulse small and weak; drowsiness continued; was getting hiccup; the eyes were congested a little.

At 10 P.M., drowsiness and hiccups still continued; no stool; no urine; no vomiting; temperature normal; pulse small and weak.

On the 9th, at 6 A.M., drowsiness had passed into deep stupor; did not answer questions; was otherwise as before.

The former medicines were omitted. He was ordered a mustard sinapism to the loins; a blister to the crown of the head; and castor-oil ʒii.

At 12 noon, one stool; otherwise in the same state.

At 5 P.M., one stool; stupor increased; respiration difficult.

At 9 P.M., one stool in the bed; otherwise the same.

On the 10th, at 2 A.M., one stool in the bed; no urine; hands and feet cold.

At 6 A.M., the stupor still continued.

At 12 noon, stools passed in the bed; stupor increased; dyspnoea increased; pulse good.

He was ordered dry cupping over the loins; and a warm water enema.

At 6 P.M., he was comatose; the dyspnoea was increased; the pulse was small and feeble; and he was moaning.

At 12 midnight, he was groaning; breathing with great difficulty; body icy cold and perspiring; pulse very feeble; talking incoherently.

At 5½ A.M., on the 11th, he was gasping for breath.

At 6½ A.M., he was dead. . . .

Post Mortem Examination three hours and a half after death; an incision being made, the divided muscles were found red. The mucous membrane of the intestines was throughout deeply congested. The liver and spleen were apparently normal. The kidneys were both unusually congested, and on pressure yielded a milky juice from the uriniferous tubes. The heart was of usual size and healthy looking; its cavities contained pale fibrinous as well as blood clots. The lungs were both very much congested. The sinuses of the dura-mater and the vessels of the pia-mater were turgid and full of blood, and on dividing them about half a gum-blow-full of blood and serum escaped on the floor. There was found a slight effusion of lymph under the arachnoid over the anterior surface of the cerebrum. The substance of the brain itself was anæmic and firm. The lateral ventricles contained some fluid. The choroid plexuses were very much congested.

CASE 47.

CHOLERA, URÆMIC COMA, DEATH IN ABOUT 7 DAYS.

Congestion of the intestines and lungs, solid effusion into and prominence of the solitary glands of the ileum, kidneys not examined.

Juggoo, aged twenty-five years, a Hindu barber, was admitted into my ward at 8½ A.M. on the 16th February, 1865.

He stated that he was ill with purging for five days; had had vomiting and cramps the first two days; had not passed urine for four days.

He was somewhat prostrated; his eyes were slightly sunk; pulse at the wrist feeble but distinct; extremities cold; bowels not moved since day-light; thirst very urgent.

He was ordered rum and ammonia mixture \mathfrak{z} i every half hour, Brandy 1 measure, ice 1 pound, milk and sago diet.

At 11½ A.M., he had taken his medicine, and was much the same.

At 2 P.M., he had had no urine; no stool; no vomiting; no cramps; his respiration was good; but the pulse was getting weaker.

At 4 P.M., he was much the same.

On the 17th in the morning, he was comatose, groaning, and restless; and had still made no urine; his pulse was just perceptible at the wrist; skin dry and harsh; he made efforts to sit up, but fell down as often as he tried.

His former medicines were omitted.

He was ordered gin mixture \mathfrak{z} i. every two hours, a mustard plaster to the loins; and milk and sago diet.

At noon he was worse.

At 4 P.M., the coma was deeper; the pulse imperceptible at the wrist.

The head was ordered to be shaved and blistered.

At 7½ P.M., he was gasping for breath. Soon after this he was dead.

Post Mortem Examination fourteen hours after death. On opening the large intestine the cæcum and ascending colon were found covered with retiform injection; the mucous membrane of the ileum, rather pale, had some patches of congestion, and a great number of bodies of a whitish colour and of the size of mustard seeds but of a hard consistence, dispersed through it; the mucous membrane of the jejunum was highly congested, the valvulæ conniventes forming red coloured bands, and looking like the choroid plexuses when injected; there was no congestion in the cæcocolon.

The lungs were expanded, of a purplish colour, and on section, gave out a great deal of reddish serum. The lower lobe of the left lung was more solid and drier on section than the right. (The kidneys were not examined.)

CASE 48.

CHOLERA, URÆMIC COMA, DEATH IN 8 DAYS.

Congestion of the intestines and liver ; spleen atrophied ; lungs and heart said to have been healthy ; kidneys and brain not examined.

Debee, aged twenty-nine years, a Hindu female, was admitted into my ward at 10½ A.M. on the 28th October, 1865, ill with cholera for three days.

She was suffering from purging, vomiting, and cramps, with the strength greatly prostrated ; pulse absent at the wrist ; extremities cold ; eyes sunk ; manner restless ; thirst great. She was ordered ether mixture ℥i every quarter hour ; lead mixture ℥i every four hours ; ginger friction ; brandy and ice ; sago diet.

At noon no pulse at the wrist.

At 5 P.M., two stools ; pulse perceptible.

The purging continued nearly throughout. The vomiting ceased after some days.

The urine, which was suppressed for some days, returned and was discharged but imperfectly, and then again failed with the cessation of the purging. During the last twenty-four hours she had neither stool nor urine. Now coma supervened, and she died of it

Post Mortem appearances as in the summary.

CASE 49.

CHOLERA, URÆMIC DYSENTERY, DEATH IN 13½ DAYS.

Congestion of all the abdominal and thoracic viscera ; vesicular affection and ulceration of the solitary follicles, and pellicular exudation on the surface of the large intestines.

Moolchand, aged twenty-five years, a Hindu broker, was admitted into my ward at 6 P.M. on the 20th January, 1866, ill with purging and vomiting from the morning.

He was greatly prostrated; his pulse was small and feeble; temperature of the trunk a little below the natural standard; extremities very cold; mind perfectly clear; thirst moderate; manner quiet; muscles free from cramps; urine not passed; bladder not distended.

He was ordered stimulant mixture \mathfrak{z} i every hour; ginger friction; brandy and ice occasionally; milk and sago four times a day.

At 1 o'clock in the night, he had one stool; made urine; and felt better.

On the 21st in the morning, he had passed one stool; his skin was hot; pulse feeble.

At 5 P.M., no stool; vomited once; passed urine once.

At midnight he was much the same.

On the 22nd, at 6½ A.M., he had one stool; in other respects as before; extremities warm.

At 5½ P.M., two stools; bladder distended; two pints of urine drawn off by the catheter.

On the 23rd, the urine again required to be drawn off.

On the 24th, the urine had also to be drawn off.

On the 25th, there was a roseolar eruption on the right arm, and the urine had to be drawn off morning and evening, and at night. He was talking wildly; felt very thirsty; and had a weak pulse.

On the 26th, the urine was drawn off twice; he was still delirious; his lower extremities were cold.

On the 27th, one stool, semi-liquid, yellowish green; pulse feeble; tongue furred; he said he had made urine himself.

On the 28th, he had had many stools; the bladder was again distended; and the urine required to be drawn off twice; he was now very low; his pulse was feeble; skin cold. He was ordered kino-powder with opium gr. .xx every four hours; stimulant mixture \mathfrak{z} i every hour.

On the 29th, three stools ; urine drawn off.

On the 30th, one stool ; made urine himself.

On the 31st, one stool ; made urine without help.

On the 1st February, one stool ; made water himself.

On the 2nd, ten or twelve stools, scanty, muddy-red, frothy, passed with straining ; tongue glazed ; thirst considerable ; voice low ; did not take any food.

At 7 P.M., he had no pulse at the wrist ; and his extremities were cold.

At 8½ P.M., he was dead.

Post Mortem Examination fourteen hours after death. The mucous membrane of the large intestine was deeply and uniformly congested ; the solitary follicles were filled with a transparent fluid, and, in some cases, had burst and given rise to minute ulcers ; the rectum was covered with a pellucular exudation ; the mucous membrane of the ileum and jejunum was also deeply congested ; and of the stomach partially ; the other viscera were generally congested.

CASE 50.

CHOLERA, URÆMIC DYSENTERY, DEATH IN 17 DAYS.

Bright's disease of the kidneys ; congestion, thickening, ulceration, pigmentary degeneration, and vesicular affection of the solitary glands of the intestines ; prominence of Peyer's patches.

Puncharam Dey, aged forty, a Hindu guide, was admitted into my ward with cholera on the 20th June, 1865.

He had been ill with purging and vomiting since the day before.

He was very prostrated ; his eyes were sunk in their sockets ; voice low ; skin cold ; pulse gone ; abdomen slightly painful about the umbilicus ; tongue moist and furred ; hypogastrium clear under percussion ; thirst indifferent.

He was ordered some brandy and ice; stimulant mixture \mathfrak{z} i every half hour; ginger friction; and sago occasionally.

At 6 P.M., he was perspiring copiously; his skin was cold and shrivelled; pulse imperceptible; he had had no motion or urine, but vomited twice; and was very thirsty.

On the morning of the 21st, he had not passed stool or urine since the previous report, but vomited once; his pulse was faintly perceptible at the wrist; there was a slight pain on pressure in the umbilical region; the tongue was dry, and covered with a thick yellow fur; thirst considerable; eyes slightly congested; respiration somewhat difficult; voice low; skin not much below natural temperature.

The medicines and diet were continued as before.

At 9 P.M., he had not passed any urine yet; had had no stool; vomited once; his pulse was weak; voice low; skin colder than natural.

On the morning of the 22nd, he was still without any urine; had had no vomiting or purging since the last report; was very thirsty, and cold at the extremities; his respiration was difficult; eyes congested; tongue moist, but covered with a yellowish fur.

A mustard plaster was ordered to be applied to the loins, and he was allowed milk and sago.

On the 23rd, he had passed urine once after the mustard plaster; had not vomited, but the bowels were still confined; his thirst was still urgent; eyes less congested; pulse feeble; tongue moist and covered with a yellowish fur.

He was allowed to bathe; his mixture was ordered to be given every three hours; and he was placed on milk diet.

On the 24th, he had had a stool, and passed urine once; had not vomited; pulse, tongue, thirst, and eyes were the same as in the last report.

He was ordered Infus. Calumb. \mathfrak{z} ii thrice a day, and chicken broth Oi in addition to the milk diet.

At 5 P.M., he passed a stool in the bed clothes.

On the 25th, he had had two stools; had made urine; his pulse was feeble; skin clammy; thirst natural; eyes slightly congested; respiration difficult.

The medicine was continued the same, and so also the diet.

On the 26th, he was in the same state, but had passed two loose stools.

Treatment continued as before.

On the 27th, it was noted that he had had a slight fever the evening before, and some cough.

He was ordered Quip. Sulphat. gr. iii thrice a day.

On the 28th, he had had a return of the fever, and was still suffering from the cough and dyspnoea; his body was of ordinary temperature; thirst great; tongue furred; bowels confined; appetite bad.

On the 29th, he had had no return of fever; his respiration was slightly difficult; temperature natural; pulse good; tongue moist, but covered in the centre with a yellowish fur; appetite improved; bowels moved four times; motions loose.

He was allowed some fish curry in addition to his former diet.

On the 30th, he had had about twenty stools, liquid, grumous, and bloody, having floating on the surface some small faecal lumps.

His former medicines were omitted, and he was ordered

R Acid. Gallic.	gr. x.
„ Sulphur. dil.	m. x.
Tinct. Opii.	m. v.
Aquæ Camphor.	℥i.

M. ft. haust. to be taken every four hours.

R Spirit. Ammon. Aromatic.	m. x.
„ Æther.	m. x.
Aquæ Camphor.	℥i.

M. ft. haust. to be taken every two hours.

Fomentation to the abdomen.

Fish curry to be omitted.

On the 1st July, he had had fever, and several stools, small, liquid, and bloody, with two or three lumps of fæces.

He was ordered enemata of tannic acid solution, morning and evening.

On the 2nd July, he had had another return of fever, and many stools, liquid, grumous, with floating pieces of fæces, and yielding on washing a good deal of blood-streaked ropy mucus, and some thready mucus.

The gallic acid mixture was omitted, stimulant mixture and fomentation continued, and the following prescription ordered :—

R	Ipecacuan.	gr. iii.
	Sod. Carbonat.	gr. v.
	Pulv. Acaciæ	gr. x.

M. ft. pulv. to be taken every four hours, and alum and babul enemata twice a day.

On the 3rd, he had had no return of fever; his temperature was below par; respiration difficult; pulse very feeble; tongue moist, and covered in the centre with a brownish yellow fur; thirst considerable; stools numerous, liquid, rusty-coloured, with some small suspended pieces of fæces, smaller than the previous day, yielding on washing only about four or five pieces of gelatinous mucus.

On the 4th, he was evidently lower, and worse; had a severe pain across the abdomen; and had had numerous stools.

On the 5th, he had had a return of fever; his body was hot; stools as before; and, besides, he had occasional hiccup.

The stimulant mixture was ordered every quarter hour.

On the 6th, he became very bad, and died about quarter past two, P.M.

Post Mortem Examination twenty hours after death. Weather cloudy, cadaveric rigidity still present in the lower extremities.

On opening the abdomen the intestines were found adherent. On slitting up the alimentary canal, the mucous membrane of the large intestine was found congested and thickened to double its natural depth; the congestion in the cæcum and part of the ascending colon was partly loose retiform, and partly arboriform, with a slight extravasation of blood from the vessels; after this it was maculiform, and the rest uniform, with here and there pale, soft, mammelated portions. In the sigmoid flexure the calibre of the tube was contracted; its inner surface was rugged, containing several cicatrices more or less contracted; the mucous membrane highly congested and covered with a pellicular exudation. At the commencement of the rectum there were two similar cicatrices, thickened and congested, and a few minute ulcers, most of them not larger than a pea, some confluent and irregular in outline, in every case the ulcers being surrounded by ecchymosed patches. In the lower part of the rectum, there was black pigmentary degeneration; the mucous membrane was thickened and congested, and there was cystiform or vesicular affection of its solitary glands, on cutting through the outer covering of which little pits or ulcers were exposed. The mucous membrane of the ileum next to the ilco-colic valve was blackened, and the Peyer's patches here were unduly prominent; for about three feet after this, it contained only uniform congestion and two little patches of mammellation, and congestion around the mammellary bodies; after this there were three larger patches of a deeper colour, with a good deal of thickening of the valvulæ conniventes, and distinct mammellation and congestion. The lowest of these patches was about three inches in length, involving the whole calibre of the gut. The middle one was 2½ feet long, of which the lower folds were more vividly red than the upper ones, the congestion gradually fading to within a short distance of the third patch. There was no congestion in the jejunum, duodenum, or stomach. The liver and spleen were healthy. The kidneys were both highly congested and flabby; the cortical substance was coarsely granular and atrophied; pelvic

membrane dull; a milky-looking fluid, containing desquamated epithelium, escaped on pressure over the papillæ.

The lungs, at their posterior aspect, were hypostatically congested, the left more than the right; otherwise good.

CASE 51.

CHOLERA, URÆMIC DYSENTERY, DEATH IN 26 DAYS AND 4½ HOURS.

Congestion and ulceration of the large intestines.

Moosu Ismail, aged thirty years, a Mahomedan khalasee, was admitted into my ward on the 7th January, 1866.

He was ill with purging, vomiting and cramps from 7½ A.M., and suffering from them still; was very thirsty; and had a very small pulse; and a dry tongue,

He was ordered lead mixture ℥i every three hours; ether mixture ℥i every quarter hour; ginger friction; brandy and ice occasionally; sago diet.

At 3 P.M., he had had three stools; no vomiting; no urine, his pulse was imperceptible at the wrist; thirst very great.

At 10 P.M., three stools more; no urine; pulse barely perceptible; a hiccup now and then.

On the 8th in the morning, he had had many stools during the night, and got a copious rice-watery motion during the visit; had made urine; had not vomited; felt very hungry; had a very small and feeble pulse, and a dry and furred tongue.

He was ordered alum and babul enemata twice a day, and milk with the sago.

At 2½ P.M., his pulse was feeble; temperature good; he had had five stools; passed urine; vomited twice.

On the 9th, at 6 A.M., he felt better; had had five stools; passed urine; had not vomited.

The lead mixture was omitted ; ether mixture to be given every hour, enemata continued.

At 6 P. M., no stool ; vomited twice ; pulse fair ; no urine.

At 12 midnigh^t, one stool ; vomited once ; made urine ; pulse fair.

On the 10th, at 5 A.M., two stools ; vomited once ; passed urine ; felt hungry ; pulse pretty good.

Beef-tea Oi was added to his diet.

At 5½ P.M., had had four stools ; passed urine freely.

On the 11th, at 7½ A.M., several stools ; urine free ; no vomiting ; pulse very feeble ; tongue moist and clean ; appetite good.

The former medicines were omitted.

He was ordered stimulant mixture ℥i every two hours ; chalk mixture with tinct. kino after every stool.

Port wine one measure, instead of brandy.

At 11½ A.M., five stools ; respiration rather difficult ; urine free.

At 3 P.M., three or four stools ; otherwise as before.

On the 12th, at 6 A.M., two stools ; urine said to be free ; no vomiting ; skin of ordinary temperature.

He was ordered rice and fish, milk Oi.

On the 13th, he had had four stools.

On the 14th, no stool.

On the 15th, three stools.

On the 16th, three stools.

On the 17th, twelve or thirteen stools, semi-solid, feculent, dirty-brown.

The chalk mixture was omitted ; and he was ordered Pulv. Kino c. Opio gr. xx every four hours.

On the 18th, less stools ; pulse fair ; felt better.

On the 19th, six or seven stools ; vomited twice.

The stimulant mixture was omitted.

Alum and ~~Babul~~ enemata resumed.

On the 20th, ten stools, small, fæculent, semi-liquid.

On the 21st, seven stools.

On the 22nd, five stools, thin, fæculent, yielding on washing undigested rice and mucus.

On the 23rd, pulse small ; tongue covered with a white fur ; stools consistent, greenish yellow, apparently not very numerous.

On the 24th, five or six stools, fæculent, semi-fluid, yellowish.

On the 25th, several stools, semi-fluid, containing some solid pieces, yellow, not very copious ; recti muscles of the abdomen tense ; flanks soft ; tongue cleaner than before.

On the 26th, five stools.

On the 27th, twenty-three stools. 4 P.M., ten stools.

On the 28th, stools passing in the bed ; urine free ; mind clear ; pain on pressure in the iliac regions.

On the 29th, stools in the bed. All former medicines were omitted except the enemata. He was ordered Pil. Hydrarg. gr. ii, Opii gr. i every four hours.

On the 30th, still passing stools in the bed.

On the 31st, there was a cadaveric odour about the body ; the voice was low ; pulse very feeble ; stools passed in the bed ; gums not sore.

On the 1st February, eight stools passed in the bed : tongue clean and moist ; look decidedly better. Omit injection.

On the 2nd, he was lying on his back, with the eyes fixed ; no pulse ; respiration slow ; could not swallow medicines.

At 8½ A.M., he was evidently dying.

At 12 noon he was dead.

Post Mortem Examination twenty hours after death. The stomach and small intestines were quite healthy. Large intestine a good deal shrunk and moderately thickened; cæcum nearly healthy; ascending colon congested in a retiform manner, and containing several ulcers with rugged and congested margins and a dirty bed; transverse colon throughout irregularly ulcerated; descending colon deeply congested and marked by a few shallow ulcers; sigmoid flexure also similarly affected, and, further, its solitary follicles appeared to form yellow prominences each of the size of a pea, which in some instances had their points softened and ulcerated.

The kidneys and other organs were not examined.

CASE 52.

CHOLERA, CONVALESCENCE, FEVER, EXHAUSTION, DEATH IN 15 DAYS AND 3. HOURS.

Cirrhosis of the liver, congestion of the kidneys, chronic thickening of the mucous membrane of the colon, old ulcers in the rectum.

Lokhon, aged twenty years, a Hindu bearer, was admitted into my ward at 6½ P.M. on the 6th February, 1866, ill with cholera since the morning. His pulse was barely perceptible at the wrist; temperature fair.

He was ordered tannic acid mixture one doze, stimulant mixture ℥i every quarter hour; a mustard sinapism to the epigastrium; brandy and ice occasionally; sago diet.

The suppression of urine lasted only for thirty-eight hours; the vomiting for sixty hours till he ejected two round worms; the diarrhoea gradually diminished; the pulse, temperature, and respiration more or less recovered.

On the 8th day of the disease, he was placed on the infusion of calumba. On the 10th day, he required castor-oil to move his bowels.

But on the 18th day, he got a smart attack of fever. At 5 P.M., his skin was hot, eyes suffused, pulse 130, tongue red and glazed.

On the following morning, the pulse was 90, tongue still glazed, lips and teeth covered with sordes, mind clear, but the strength very low.

After this he rapidly sank and died on the morning of the 21st February, or the commencement of the 16th day of the illness.

The *Post Mortem Examination* revealed the morbid appearances specified in the summary.

CASE 53.

DIARRHŒA FOR 4 DAYS, CHOLERA, COLLAPSE, DEATH IN 33 HOURS.

Congestion of the intestines, liver, spleen, kidneys, and lungs.

Bundoo, aged forty-five years, a Hindu domestic, was admitted into my ward at 10 A.M. on the 31st October, 1865, with a five days' illness.

The first four days he suffered from looseness of bowels, which the day previous to admission about noon passed into cholera. He had passed many liquid stools, vomited several times, and made no urine.

He was greatly prostrated; his eyes were sunk and congested; pulse absent at the wrist; extremities cold; tongue dry and furred; muscles free from cramps; thirst great; bowels not moved since the morning; rest broken by hiccups.

He was ordered a mustard plaster to the epigastrium; ginger friction; stimulant mixture $\frac{\text{ʒi}}$ every quarter hour; ice and brandy; milk and sago for diet.

At 3½ P.M., he was worse.

At 7½, he was unconscious, and breathing with difficulty.

At 8½, he was gasping for breath.

At 9 P.M., he was dead.

Post Mortem Examination eleven hours after death. Lower extremities rigid, upper less, the morbid appearances as noted in the summary.

CASE 54.

DIARRHŒA, CHOLERA, URÆMIC COMA, DEATH IN 8 DAYS.

Lobulation, distortion, atrophy, urinary cysts on the surface, granular degeneration, and desquamation of the epithelium of the kidneys; congestion of the intestines and brain; thick, tarry blood in the right ventricle of the heart; and anæmia of the lungs.

Ram Dass, aged thirty years, a native of Orissa, lately arrived from the famine district, was admitted into my ward at 10½ A. M. on the 12th June, 1866, with a three days' diarrhœa.

He passed three or four stools a day; made urine freely; had no loss of temperature; but a feeble though regular pulse; and was very weak from stravation.

He was ordered chalk mixture ℥i with tinct. opii m. v every three hours; rum mixture ℥i every four hours; milk and sago four times a day.

Up to 9 P.M., he had had no stool; no vomiting; made urine freely; and continued to improve in every way.

On the 13th in the morning, he was in the same state.

At 11 A.M., he had had one stool; vomited once; made no urine; felt a little drowsy; had a feeble pulse; but good temperature.

At 1 P.M., he had had two stools; made urine; but complained of thirst.

From this to 7 P.M., he had had no more stool or vomiting, and made urine freely, while the pulse and temperature remained fair.

At 9 P.M., however, he was passing stools in the bed.

On the 14th, at 2 A.M., he was still passing stools in the bed without vomiting, suppression of urine, or loss of temperature.

At 5½ P.M., he was in the same state passing stools in the bed.

At 12 noon and 3 P.M., he was still passing stools in the bed; his pulse and temperature were fair; but he was getting drowsy and some difficulty of breathing.

At 6½ and 10 P.M., he was still passing stools in the bed.

On the 15th, at 1 A.M., he still passed stools in the bed; had had no urine; his pulse was small and weak; temperature below par; eyes congested.

At 8½ A.M., he was much the same but drowsy, and quite quiet.

At 11 A.M., he was in a state of stupor, passing stools still in the bed, and breathing with difficulty.

His former medicines were omitted. He was ordered stimulant mixture ℥i every half hour, and beef-tea, and port wine 2 measures.

At 1½ P.M., passing stools in the bed; pulse barely perceptible at the wrist; mind as before.

At 10½ P.M., no stool; no vomiting; no urine; pulse scarcely perceptible; unconsciousness complete; eyes fixed.

On the 16th, at 6 A.M., he was in the same state, but passing stools in the bed since two o'clock; had made no urine; and was breathing with difficulty.

At 11½ A.M. and 3½ P.M., his reports were the same.

At 9½ P.M., he had no pulse; was very cold; and moaning.

About one o'clock in the night his respiration was very difficult and noisy; there was no pulse; and the body was icy cold.

On the 17th, at 4 A.M., he was dead.

Post Mortem Examination five hours after death. The kidneys were shrunk, lobulated, distorted, and occupied with urinary cysts on the surface; on section their pyramidal portions were smaller and less striated, but the cortical more abundant than natural; on pressure a milky fluid escaped from the uriniferous tubes. The mucous membrane of the intestines was more or less uniformly congested; the liver and spleen were natural; the lungs were anæmic and very much shrunk. The heart was healthy; its right ventricle contained some tarry blood. The meninges were congested, and the vessels of the pia-mater full; on section the substance of the cerebrum appeared to be a good deal condensed, and thick venous blood flowed from its divided vessels.

CASE 55.

DYSENTERY, DIARRHŒA, CHOLERA, EXHAUSTION, DEATH IN 5½ DAYS.

Both lungs gorged with venous blood, dark blood in the left ventricle, fluid in the pericardium, ulcers in the colon, congestion of the rectum, adhesions of the liver, enlargement of the right kidney, urine in the bladder.

J. Nedding, aged twenty-five years, an English sailor, was admitted into my ward on the 25th October, 1861, ill with cholera since the morning.

He stated that he had had dysentery four months ago, for which he was in hospital for a month at the Mauritius; had another attack of the same six weeks ago, from which he recovered only a fortnight since. For four days before admission he had had diarrhœa which had at last merged in cholera.

He was ordered Pulv. Kino c. Opio ʒi every four hours, and low diet. —

At 8 P.M., it was reported that he had been purged frequently since admission; had had no vomiting, but great nausea and cramps in the extremities; his pulse was absent at the wrist; skin cold and clammy.

He was ordered ether mixture \mathfrak{z} i every hour, lead mixture \mathfrak{z} i every two hours, and brandy and ice. The kino powders were omitted.

On the 26th October, he was passing frequent stools in the bed; had vomited three or four times; his countenance was much depressed; eyes sunken; pulse barely perceptible; extremities cold; surface covered with a cold clammy perspiration, especially the forehead; thirst very great; tongue reddish; respiration easy; cramps in the legs slight.

The former medicines were omitted. He was ordered Argenti Nitr. gr. i, Opii gr. ss, every four hours; sugar of lead and laudanum enemata morning and evening, stimulant mixture \mathfrak{z} i every hour; mustard plaster to the epigastrium; ice and brandy as before; and sago and milk for diet.

On the 27th, he was still passing stools in the bed; had vomited twice; his countenance was sunk; pulse fair; appetite rather dull; tongue glazed; sleep disturbed; lower extremities still cold; voice low; urine absent; percussion note of the hypogastrium clear.

The same treatment was continued; besides, a mustard plaster ordered to the loins.

On the 28th, no urine; appearance better; extremities warmer; eyelids slightly injected; percussion note over the bladder clear.

He was ordered gin mixture \mathfrak{z} i every three hours.

On the 29th, fourteen thin watery stools; no urine. Another mustard plaster to the loins, and chicken broth.

On the 30th, no urine; many liquid stools; pulse fair.

The pills were omitted. He was ordered Quin. Sulph. gr. v, Ammon. Carbon. gr. v, and Camphor. gr. iii every four hours; blister to the head; mustard plaster to the loins; diet as before.

At 8 P.M., he was restless, and wanting to get up; had passed no urine, but many stools in the bed; was very thirsty. At 11 P.M., he was dead.

Post Mortem Examination, ten hours after death. The left lung was loosely adherent to the thoracic parietes; both the lungs were gorged with venous blood; the pericardium contained half an ounce of straw-coloured serum; the left ventricle was filled with dark-coloured blood. The whole surface of the liver was firmly adherent to the diaphragm and abdominal parietes; its appearance paler than natural. The right kidney was enlarged. The bladder contained two ounces of urine. The small intestines presented nothing very particular. The large intestine contained several old ulcers and cicatrices. The mucous membrane of the rectum was deeply congested..

CASE 56.

DYSENTERY, CHOLERA, EXHAUSTION, DEATH.

Granular degeneration of the kidneys; dark colour, cicatrices and ulceration of the mucous membrane of the large intestine, congestion of the small intestines and lungs.

Hurdeb, aged twenty-eight years, an unemployed Hindu, was admitted into my ward at 10 A.M. on the 10th August, 1865.

He was ill with diarrhœa for four days.

His strength was very low; pulse weak, small but regular; temperature fair; appetite poor.

He was ordered rum mixture ℥i every four hours; chalk mixture ℥i every two hours; milk diet.

At 2 P.M., he was the same, but had had no stool.

At 10 P.M., he had still had no stool; his temperature was below par; extremities cold; pulse feeble; voice low; tongue covered with thick white fur; appetite nil.

On the 11th in the morning, he was much prostrated; bowels not moved; eyes reddish.

The chalk mixture was omitted.

He was ordered rum mixture ℥i every two hours.

At 3 P.M., the prostration was increased; and he was passing stools in the bed-clothes.

On the 12th, at 1 A.M., he was still passing stools in the bed-clothes; and spoke with difficulty.

At 7 A.M., his respiration was a little difficult; and he had had no urine.

At 1 P.M., he was still passing stools in bed-clothes; had had no urine; and his eyes were congested.

On the 13th in the morning, he had had no stool; nor urine; his temperature and pulse were better.

All medicines were omitted.

On the 14th, the suppression of the urine and congestion of the eyes still continued.

On the 15th, he had passed urine four times, and four stools.

He was ordered chalk mixture ʒi thrice a day, and milk and sago four times.

On the 16th, he had had no more stool; passed urine once; there was some eruption on the skin. Medicine was omitted.

He was allowed milk and rice and fish curry.

At 4 P.M., he had had three stools.

At 8 P.M., he had had two stools more; no urine; his pulse was weaker; body cold; countenance anxious.

He was ordered stimulant mixture ʒi every quarter hour.

At 11 P.M., two more stools; no urine; vomited once.

At 2 A.M., on the 17th, one stool; no urine; no vomiting.

At 8 A.M., passed urine once; vomited ~~excess~~

At 5 P.M., three stools. On the 18th, four stools. On the 19th, frequent stools; was getting bed-sores. On the 20th, nine stools in the morning, many afterwards; was sinking. On the 21st, he was worse. On the 22nd, he was

passing stools in the bed-clothes and moaning. On the 23rd, he died at 4½ P.M.

Post Mortem Examination thirteen hours after death. Cadaveric rigidity more marked in the lower than the upper extremities. The large intestine was dark-coloured, and had four or five cicatrices and several small ulcers; the mucous membrane of the small intestine was highly congested in an uniform manner; the kidneys were both granular; lungs congested; liver and spleen healthy. Heart also healthy.

CASE 57.

CHRONIC DYSENTERY, ABDOMINAL CELLULITIS, CHOLERA, COLLAPSE, DEATH IN 14 HOURS.

Abscess of the abdomen, ulcers in the large intestine.

Surroop, aged sixty years, a Hindu washerman, was admitted into my ward at 7 A.M. on the 4th May, 1865, moribund and without a proper previous history. He was ill with purging and vomiting since the morning; had passed many stools and vomited several times.

He was much prostrated; his pulse was very feeble; extremities cold; voice low; thirst very urgent. He was ordered stimulant mixture $\frac{3i}{\text{every quarter hour}}$; brandy and ice occasionally; sago diet.

At 12 noon, he had had no stool; no vomiting; no urine; he had no pulse at the wrist; his extremities were cold; voice husky.

At 2 P.M., no stools; no vomiting; made urine once; no pulse at the wrist; thirst still great; cramps of the extremities severe; respiration hurried.

At 4 P.M., ~~he~~ he was in the same state as described in the last report; had had no stool; no vomiting; no urine.

At 7 P.M., he was gasping for breath.

At 8 P.M., he was dead.

Post Mortem Examination thirteen hours after death. On opening the abdomen there was found a cavity in the right iliac fossa full of purulent matter; when the pus was washed out by water, a pretty large opening was discovered to lead into another sac full of matter inside the intestine. Various ulcers were found to exist in the course of the large intestines with portions of the mucous membrane in a state of sloughing. Near the cæcum, but external to it, inflammatory lymph was thrown out, which agglutinated different portions of the small intestines together, and to the cæcum and ascending colon, preventing their unravelment.

CASE 58.

HEPATIC ABSCESS, CHOLERA, COLLAPSE, DEATH IN 13½ HOURS.

Sixteen abscesses in the liver which was much enlarged.

George Thomas, aged thirty-five years, a West Indian sailor, was admitted into my ward on the 17th December, 1864, in a moribund condition. It was said he was ill with purging and vomiting since 4 A.M.; but he was too bad to give any more previous history than this. He had passed urine once; was suffering from severe cramps in the extremities; had a good deal of thirst; was cold and insensible; and his pulse was barely perceptible at the wrist.

He was ordered stimulant mixture ℥i every quarter hour; ginger friction to the limbs; brandy and ice as usual; sago diet.

At 10 A.M., he had had no stool; vomited once.

At 1 P.M., he had vomited again; had had no stool; was very restless; his pulse was very low; extremities cold; tongue moist and furred.

At 3 P.M., no urine; no stool; no vomiting; restlessness increasing; he was still unconscious.

At 5 P.M., he continued comatose; his respiration was hurried and difficult; skin cold and clammy; pulse absent at the wrist; no stool; no vomiting.

" In a quarter of an hour after this he was dead.

Post Mortem Examination eight hours after death. Liver enormously enlarged so as to fill the whole breadth of the abdomen and to extend below to the umbilicus; its substance was much congested, and contained on the upper surface seven abscesses; on the under, two; and deep seated, seven; in all sixteen abscesses, of varying sizes, the largest as large as a closed fist. Lungs hypostatically congested. Kidneys and intestines not examined.

CASE 59.

CHRONIC PHTHISIS, CHOLERA, COLLAPSE, DEATH IN 17 HOURS.

Tubercles and cavities in both lungs.

Kanda, aged forty years, an Ooriah domestic, was admitted into my ward at 11 A.M. on the 15th November, 1861, ill with purging, vomiting, and cramps since 12 o'clock in the night.

He had had five or six stools, severe cramps, no urine, and vomited several times.

He was greatly depressed and low; his eyes were sunk; fingers and toes cold and shrivelled; pulse absent at the wrist; extremities affected with cramps; tongue furred and dry; thirst insatiable; appetite nil.

He was ordered stimulant mixture \mathfrak{z} i every half hour; a mustard plaster to the epigastrium; ginger friction all over the body; brandy and ice occasionally; sago diet.

He died at 5 A.M. on the 16th.

Post Mortem Examination four hours after death. The pleural cavities contained a small effusion of serum. Both the lungs were congested in appearance. The right lung was quite free—round, the left adherent superiorly and posteriorly. The upper lobe of the left lung contained several cavities, the one at the apex being as large as an orange; the lower lobe was hepatized and full of tubercles. The lower lobe of the right lung also contained small cavities, besides masses of tubercles.

CASE 60.

CHRONIC PHTHISIS, CHOLERA, COLLAPSE, DEATH IN 29 HOURS.

Congestion and ulceration of the intestines; tubercular affection of the solitary glands and Peyer's patches; tubercular infiltration and cavities in the lungs.

Belal Hossein, aged thirty years, a Mahomedan hawker, was admitted into my ward at 3½ P.M. on the 31st August, 1866.

He said that he had fever for a month and a half; it was intermittent and occurred every four or five days, often with shivering; it had ceased to return, however, for some six or seven days. He had had a cough also for about a month, and for four days previous to admission hæmoptysis, during which time his bowels had been confined.

His skin was cool; pulse tranquil; tongue anæmic; bowels costive; legs swollen; eyes pale; and chest painful.

He was ordered stimulant mixture ℥i every hour; and milk diet.

On the 1st September, his feet and arms were œdematous; pulse 64, vibratile, of moderate size, weak; stature large; skin of the chest in front marked with numerous cicatrices, two of which were still raw; cough loose, though troublesome; expectoration purulent, about 4 oz., of a reddish colour, not particularly fætid; percussion note of the whole of the left front dull, right clearer, left back dull, right a little clearer. Three more cicatrices on the spine, and one on the left side. Respiratory sounds feeble and distant in the left infrascapular and infrascapular regions, attended with a little submucous rhonchus; weak and vesicular, also attended with submucous rhonchus, in the interscapular; vesicular, fuller and stronger in the right back; vesicular, weak, attended, with mucous rhonchus in the left infraclavicular; blowing metallic, attended with large mucous rhonchus in the left mammary; vesicular, full, and strong throughout the right front: vocal fremitus weak on the left side, both in front and behind, strong in the right side; the blowing metallic respiration noticed in the left mammary was confined to a spot about the size of a moderately large patella, with a

tubular projection from its upper and outer aspect towards the summit of the left axilla. The cough over this spot and its tubular processes was ringing, voice bronchophonic.

The stimulant mixture was continued. He was ordered cod-liver oil ʒi thrice a day; milk and sago four times, beef-tea Oi, port wine 2 measures.

On the 2nd, he was found lying on his right side; sleeping tranquilly; breathing 32 times in the minute; pulse 76; skin of ordinary temperature; anasarca of the extremities less; expectoration more consistent, mucous, and less blood-stained. On being woke up he said that he felt better and very hungry, and had had two good solid stools. The percussion note of the left front of the chest was much clearer than the day before, though still duller than the right front. Respiration where it was cavernous the previous day still continued so, but without any rhonchus; occasionally a little metallic tinkling; little or no rhonchus any where else. The treatment was continued. He was allowed chicken diet, besides the wine and beef-tea.

On the 3rd, he felt still better; his expectoration was considerably less, being about two drachms, with very little blood, and formed into sputa more mucous than purulent; cough less; stools ten or twelve, yellowish brown, liquid, *feculent*, yielding on washing nothing particular; dullness on percussion in the left front much the same, and a mucous rhonchus all over this side; cavernous rhonchus in the circumscribed space in the mammary region noticed before; perspired a good deal in the latter part of the night; slept well; had fever about 6 P.M.; appetite great; said that he took habitually six pice worth of opium twice every day; was able to sit up.

He was ordered opium gr. ii twice a day in addition to his other medicines.

On the 4th, pulse 92; stools five; skin hot; said he felt better.

On the 5th, no stool; urine very free; expectoration very scanty; hunger increased.

On the 6th, the improvement continued.

On the 7th, cough less; expectoration very much less in quantity, consisting of two or three sputa more mucous than purulent, slightly greenish, non-aerated; he felt better; and had a good appetite.

On the 8th, he had had no return of fever the day before; but complained then of giddiness of the head; his skin was slightly warmer than natural; pulse 84, moderately full; bowels moved once. He was ordered *Ol. Ricin.* ziv which, however, he did not take.

At 8 P.M., his bowels became very loose, and he began to have vomiting and cramps.

On the 9th, at 5 A.M., he was passing large watery stools in the bed.

He was ordered a dose of chalk mixture.

At 8 A.M., he was still passing stools in the bed, and very low; his eyes were sunk with the whites out; extremities cold and clammy; respiration 19; pulse 70, small and weak; tongue moist, dull-red; voice husky; vomiting ceased; cramps occasional; no urine since the attack.

The chalk mixture was continued every two hours with *Tinct. Catechu* zss. and *Tinct. Kino.* zss. in each dose.

The stimulant mixture every hour.

The cod-liver oil was omitted already.

Brandy and ice occasionally. Sago diet.

At 10 A.M., one stool; no urine; respiration difficult; pulse very low; extremities cold; eyes open; but could not speak well.

At 1 P.M., he was worse; had had one stool; would not take his medicines; urine still absent.

At 5 P.M., one stool more.

At 8 P.M., no stool; no urine; no vomiting; pulse and temperature as before.

At 11½ P.M., passed some large stools in the bed.

At 1 A.M., he was dead.

Post Mortem Examination eight hours after death. Both the large and small intestines were of a pale-rose colour; in the rectum there were five deep-cut ulcers of the size of quarter rupees; in the transverse colon about ten more of the same description; in the cæcum, which was ash-coloured, numerous deep cut and superficial ulcers, and two, or three tubercular nodules which had undergone ulceration; the Peyer's patches in the ileum were elevated, congested, in some cases ulcerated, in others composed of little nodules like white mustard seeds; the left lung was solid, red coloured, large, adherent to the chest-walls by firm bonds, and covered on the free surface with a thick layer of lymph, its substance was infiltrated with tubercles and riddled full of holes, and in its upper lobe there was a large cavity, which admitted the closed fist, had anfractuous walls, and communicated with some smaller cavities situated externally; the right lung was also infiltrated with tubercle, generally softened and broken down, and at its apex there was a cavity of the size of a pigeon's egg, containing a grumous fluid like the expectoration during life; kidneys healthy-looking, and free from tubercular deposit; liver and spleen healthy; heart flabby; brain not examined.

CASE 61.

CHRONIC PHTHISIS, CHOLERA, CONVALESCENCE, ASTHENIA,
SLOUGHING OF THE CORNEAE, DEATH IN 11½ DAYS.

The upper lobe of the right lung was adherent and contained a large old irregular cavity with indurated walls.

Notoo, aged forty years, an unemployed Hindu, was picked up in the streets, and admitted into my ward at 2 A.M. on the 1st September, 1861, ill with diarrhoea for eight or nine days, and with cholera since the previous noon. He had had several watery stools; his countenance was depressed; voice low; hands somewhat shrivelled; skin cold; pulse very feeble at the wrist; thirst considerable; mind rational. No cramp or vomiting.

He was ordered stimulant mixture ʒi every half hour, and brandy and ice.

At 6 A.M., he had no pulse at the wrist; no stool; vomited once; no cramp; no urine; his extremities were cold; skin waxy; nails blue; thirst very great.

Mustard plasters were ordered to the epigastrium and loins; sago allowed for diet.

At 9 A.M., vomited once after the medicine.

At 5½ P.M., had just passed a bilious stool; vomited once; extremities cold; trunk warm; no urine; mind rational; otherwise as before.

On the morning of the 2nd, he had had three stools; vomited twice; passed no urine; had no pulse at the wrist; was too weak to talk.

Another mustard plaster was ordered to the loins.

At 4 P.M., very low; passed no urine; extremities and forehead clammy with perspiration; pulse slightly perceptible.

The mustard plaster was repeated to the loins.

On the morning of the 3rd September, the pulse was distinct at the wrist; vomited once; passed three stools; thirst much less; no urine yet; hypogastrium clear; extremities cold and shrivelled; tongue covered with a yellowish fur; abdomen very tender all over; hiccup troublesome; had no sleep at all in the night; took down his sago and retained it; countenance somewhat improved; decubitus on the back with the legs drawn up; mind quite rational.

He was ordered rum mixture ℥i every two hours; and low milk diet.

At 4½ P.M., three copious stools; great prostration; no urine; pulse very weak; body covered with cold, clammy perspiration.

On the morning of the 4th, he had slight hiccup; no urine; no stool; pulse distinct at the wrist; no thirst; mind sensible.

Rum mixture omitted. Stimulant mixture continued, Mustard plaster to the loins; milk and sago.

Ordered gin mixture (gin ℥iii, sugar ℥iii, water ℥x, lime juice ℥iii,) ℥i every four hours.

At 4½ P.M., passed urine once; one stool; pulse fair.

On the morning of the 5th, one stool; urine once in the night; doing well.

On the 6th, two stools; vomited twice; urine once; pulse good; some hiccup.

Omit stimulant mixture. Continue gin mixture.

On the 7th, no stool; no vomiting; appetite bad; pain in the loins; pulse fair; very weak.

At 4 P.M., corneæ hazy; he feels very weak; takes no food; passed urine twice.

On the 8th, same as the previous day. Ordered milk and rice. Port wine two measures.

On the 9th, prostration greater; corneæ sloughing in the centre; took some food; passed some stools.

On the 10th, right cornea almost entirely sloughed away; no stool.

At 4½ P.M., pulse almost imperceptible. Stimulant mixture ℥i every hour.

On the 11th, both corneæ had sloughed away; took no food.

On the 12th, got worse, and died at 5 P.M.

Post Mortem Examination. No blueness of nails. Peritoneal covering of intestines smooth, shining, and moist, not sticky; mucous membrane healthy; urinary bladder very much contracted. Colour of the divided muscles healthy. Skin somewhat waxy. Blood on the surface of the lungs quite red. The upper lobe of the right lung adherent to the parietes and contained a large old irregular cavity with indurated walls. The blood in the pulmonary capillaries in the substance of the lungs was red. The left ventricle was empty; the right ventricle and auricle also empty; no coagulum in any of the cavities; muscular substance of the heart healthy.

CASE 62.

CHRONIC EMPYEMA, CHOLERA, URÆMIC DYSENTERY, RECENT
LEFT PLEURISY, DEATH IN 19 DAYS.

Congestion of the large intestine, ileum, and stomach. Kidneys both in a state of granular degeneration with desquamation of the epithelium. Left pleural membrane lined with fresh lymph, and congested. Right chronic empyema, pleural membrane lined with pus, and containing a reddish fluid, with floating pieces of lymph. Right lung bound down and perforated by broncho-pleural fistulae. Left lung congested, otherwise healthy. Liver and spleen healthy.

Toonee, a Hindu servant, aged twenty-eight, was admitted into my ward on the 3rd August, 1865, with cholera.

He had been ill with purging, vomiting, and cramps since 11 o'clock in the night.

When admitted at 8½ A.M., he was much prostrated; his pulse was barely perceptible at the wrist; countenance depressed; respiration difficult; no cramps now; temperature low; thirst urgent; stomach distended with flatus; voice husky.

He was ordered ammonia and ether mixture ℥i every quarter hour, ginger friction, brandy and ice.

At 12 A.M., one stool; no vomiting; no urine; heat of the chest and abdomen usual, that of the hands and legs very low; stomach distended with flatus; pulse a little better, though still weak.

At 12 P.M., seven stools; still no urine.

On the 4th, at 6½ A.M., nine stools; no urine; temperature natural.

At 12 A.M., many stools; said that he had passed urine once (?)

On the 5th, at 7 A.M., three stools; no urine; temperature good; pulse weak but regular; appetite fair; milk diet.

On the 6th, at 6½ A.M., fourteen stools; said that he passed urine once, but only about an ounce.

On the 7th, temperature usual; respiration a little difficult and hurried; pulse weak, small, regular; tongue dryish, furred, brownish; thirst less; appetite improving; made urine twice; abdomen soft, flat, and painful, especially below the umbilicus; stools ten, thin, *feculent*, scanty.

His former medicines were omitted; and he was ordered *Mist. cretæ* \mathfrak{z} i thrice a day.

On the 8th, he had had eight stools; his pulse was better; abdomen soft, flat, painless; respiration easier.

He was ordered *Argent. Nitrat.* gr. ss, opium gr. i every four hours.

On the 9th, only six stools; in other respects better.

On the 10th, eleven stools; passed urine once.

The pills were omitted; and he was ordered *Pulv. Kino c. op.* \mathfrak{z} i thrice a day.

On the 11th, nine stools.

On the 12th, ten stools; respiration difficult; prostration increasing; is somewhat drowsy; tongue dry, glazed; pulse moderately full, regular; abdomen flat; about twelve stools; urine scanty, very offensive, *putrilagenous* in appearance.

* The former medicines were omitted; and he was ordered *ammon. and ether mixture* \mathfrak{z} i every quarter hour; milk and sago four times; port wine 2 measures.

On the 13th, he was worse, and had passed fourteen thin stools.

On the 14th, still more drowsy. *Alum and babul enemata* were ordered twice a day.

On the 15th ten stools.

On the 16th, ten stools, thin, *feculent*, dark yellow, highly offensive, yielding on washing no sediment of any kind. Respiration somewhat hurried and difficult.

On the 17th, temperature normal; tongue dull-red, glazed at the margins, furred in the centre; pulse weak, small, regular; stools twelve, yielding on washing molecular sloughs.

18th, ten stools. 19th, ten stools. 20th, six stools; he was getting very low.

On the 21st, respiration 36; pulse 96; abdomen painful; percussion note tolerably clear in front; respiration sounds on the right side feeble, being scarcely audible; rather exaggerated on the left; respiratory movements exaggerated on the left side, scarcely visible on the right; percussion note in the right back dull, left clear; respiratory murmurs in the right back coarse, feeble; left interscapular, exaggerated, and attended with a strong rubbing friction sound.

The stimulant mixture was continued, and tartar emetic ointment ordered to be rubbed on the back.

He died about 11 P.M.

At the *Post Mortem Examination* nine hours after death, weather cloudy, cadaveric rigidity full in all the extremities, nothing particular was found in the peritoneum; the mucous membrane of the large intestine was slightly dark-stained here and there; that of the ascending colon slightly congested in a retiform manner; the mucous membrane of the ileum was congested in an arboriform manner in one place, in the rest as well as in the jejunum and duodenum it was pale; in the stomach covered with punctiform injection.

Liver and spleen healthy. Kidneys in a state of granular degeneration, and yielded on pressure over the pyramids a milky fluid.

On opening the thorax and pulling out the left lung, the posterior surface of the latter was found quite rough and lined with fresh lymph; the pleural membrane here was of a dark purple colour; the substance of the lung, being divided, yielded a spumous serosity, and the section appeared bright red; the parietal pleura was affected in a similar manner.

The right pleural cavity was found converted into a large empyemic sac, the walls of which were covered with a purulent-looking substance, and the interior occupied by about seven or eight ounces of a reddish-coloured liquid, containing flocculent pieces of lymph. The lung was bound down to the inner wall of the sac, and its substance protuberant

about the middle and at the base; the latter had been inadvertently cut through, and seemed to be quite sloughy, and on its cut-surfaces were observed one or two holes, leading towards bronchial tubes; the former was uninjured; it was covered by a membrane, and appeared to be solid when the nodule was divided.

CASE 63.

TUBERCULOSIS, CHOLERA, COLLAPSE, REACTION, TUBERCULAR PLEUROPNEUMONIA, DEATH IN 5 DAYS AND 6 HOURS.

Intestines pale; kidneys congested and subjects of epithelial desquamation; right ventricle of the heart contained a small fibrinous coagulum and some dark blood, left ventricle only dark blood; right lung healthy, anterior inferior half of the lower lobe of the left lung in a state of red hepatization, lined on the surface with a soft false membrane, and occupied in the centre by a great many small masses of yellow tubercle.

Ram Von Parah, aged thirty-one years, an unemployed Brahmin, was admitted into my ward at 9 A.M. on the 2nd April, 1867, ill with purging, vomiting, and cramps, since 6 A.M. He had had four or five liquid stools, vomited four or five times, and made no urine.

He was much prostrated; his countenance was haggard; eyes sunk; thirst very great; stomach painful; extremities and trunk both cold; pulse imperceptible at the wrist; respiration difficult; mind rational.

He was ordered stimulant mixture \mathfrak{z} i every quarter hour, chalk mixture \mathfrak{z} i every two hours, a mustard plaster to the epigastrium, ice 1lb, brandy two measures, hot sago four times a day.

At 10½ A.M., he had had six watery stools since admission, and vomited once; pulse barely perceptible.

At 1 P.M., no stool or vomiting since last report; pulse barely perceptible.

At 3 P.M., one stool; vomited once; pulse very feeble; was groaning.

At 5 P.M., hands and feet cold and shrivelled; nails bluish; body cold and clammy; restlessness very great; no pulse at the wrist; respiration hurried; thirst considerable; one stool since last report; vomited once.

He was ordered a scruple doze of calomel, and the other treatment was continued as before.

At 9 P.M., no stool, vomiting, or urine; otherwise as before.

On the 3rd April, at 4 A.M., five stools; no urine; no vomiting; body cold; no pulse at the wrist; restlessness very great.

At 7 A.M., four stools; vomited twice; no urine; hypogastrium clear on percussion, not painful on pressure; no urine on introducing a catheter into the bladder; appetite good; temperature normal; pulse and respiration good; tongue pale-red, slightly furred.

Omit Medicines; to have milk and sago four times, and beef-tea Oi.

At 11 A. M., passed a round worm with a motion since last report; no urine; no vomiting; restlessness as before; temperature normal; pulse small and feeble; thirst great.

At 12 A.M., no stool; no vomiting; no urine; was sleeping.

At 3 P.M., no stool; no vomiting; no urine; temperature, pulse, and thirst much as before.

At 5 P.M., one stool, containing two round worms; vomited once; no urine; pulse feeble but distinct; eyes injected; hypogastrium clear under percussion.

At 7 P.M., one stool passed in the bed-clothes; no urine; no vomiting; pulse barely perceptible at the wrist.

At 10 P.M., three stools; vomited once; no urine; pulse very feeble; restlessness very great; extremities cold; respiration a little laboured.

On the 4th, at 4 A.M., two stools; vomited once; no urine; pulse scarcely perceptible; restlessness and dyspnoea as at last report.

At 7½ A.M., eyes somewhat congested; percussion of the hypogastrium clear.

To be dry-cupped on the loins; to have calomel gr. i. and soda gr. ii. every four hours.

At 12 noon, no stool; no vomiting; no urine; eyes still congested; thirst and restlessness very great; pulse feeble.

At 2½ P.M., pulse feeble and irregular; restlessness increasing; eyes congested; a good deal of retching.

At 5½ P.M., no stool; no vomiting; no urine; mind quite rational though drowsy; pulse barely perceptible.

At 8½ P.M., no stool; no urine; restlessness very great; pulse almost imperceptible at the wrist; mind rather delirious; thirst troublesome.

On the 5th, at 3½ A.M., one stool; at 6 A.M., another stool; at 12 noon passed urine once; no stool; no vomiting; pulse small and feeble; temperature normal.

At 1-35 P.M., one stool; passed urine again.

At 4-35 P.M., one stool; has made water just now.

At 11 P.M., no stool or urine since last report; pulse, temperature, and respiration good.

On the 6th, at 3 A.M., found sleeping; complained of a slight pain in the chest.

At 6 A.M., the pain in the chest was the same; it was confined to the left inframammary region, where the percussion note was not notably dull, but auscultation detected a friction sound.

Six leeches were ordered to the painful part, and the powders continued as before.

At 11 A.M., passed about 12 oz. of urine of a dirty brown colour.

At 5½ P.M., skin warmer; was groaning; lying on his right side. At 7½ P.M., one stool; passed urine freely. At 11 P.M., three stools; passed urine freely twice; restlessness increasing.

On the 7th, at 4 A.M., two stools; no restlessness.

At 6 A.M., one stool. At 7½, sleeping but breathing in gasps; on being awake said that the pain he felt on the left side yesterday was less since the application of the leeches; a little friction was, however, still audible in the same place, and with it some submucous rhonchus.

At 11 A.M., he was lying on his side with the eyes open and fixed, without any kind of motion. At 12 noon, he was dead.

Post Mortem Examination twenty-one hours after death. Weather hot and dry. On opening the chest the lower lobe of the left lung was found adherent to the parietes anteriorly and inferiorly. On removing the lungs from the thoracic cavity, and placing them on the back, the lower lobe of the left lung was found to be considerably swollen, of a deep purple colour, covered on the surface with a soft false membrane about a line in thickness, partly lacerated in the act of removal. On section of this part, its substance was found to be deeply congested, of a vivid red colour, moderately consolidated, the blood flowing freely from the divided vessels, and its centre the seat of a great many small masses of yellow tubercle. The upper and anterior aspect of this lobe in its inferior half was also covered with lymph and congested, in its upper half only slightly reddened, but neither swollen nor indurated. The lower border of the upper lobe in contact with the affected portion of the lower was adherent to it. The posterior and superior two-thirds of the lower lobe and the whole of the upper lobe were quite healthy, and free from tubercle.

The right lung was altogether healthy both in appearance and on section of its substance.

The right ventricle of the heart contained a small fibrinous coagulum and some dark fluid blood. The left ventricle only dark fluid blood. The spleen and liver were of usual size and look. The gall-bladder was distended with green bile. The kidneys were both deep purple. The right one on section appeared as if it had been macerated in water but not otherwise altered; the proportion between the cortical and medullary substances was natural; but a little milky fluid was forced out of the uriniferous tubes on pressure over

the pyramids. The left kidney on section presented the same characters, and yielded the same milky fluid from the uriferous tubes.

The mucous membrane of the intestines was generally pale, with the exception of a few patches of hypostatic congestion. Some of the Peyer's patches were of a livid colour.

V. PATHOLOGY.

Of the sixty-three cases narrated above, fifty-two were deaths from primary cholera, and eleven from intercurrent cholera.

Of the fifty-two primary cases, three died in the first stage from exhaustion, twenty-six in the second stage from collapse, and twenty-three in the third stage during reaction.

Of the eleven intercurrent cases, two were intercurrent to diarrhoea, three to dysentery, one to hepatic abscess, four to phthisis, and one to Empyema. Of these eleven intercurrent choleræ, two died in the first stage from exhaustion, five in the second stage from collapse, and four in the third stage during reaction.

In the three cases of primary exhaustion during the first stage, death occurred in No. 33 in $6\frac{1}{2}$ days, in No. 34 in 11 days, in No. 35 in 12 days.

In the twenty six primary collapse-cases, death took place in the following order:—In No. 1 in 7 hours, in No. 2 in $8\frac{1}{2}$ hours, in No. 3 in 9 hours, in No. 4 in $9\frac{1}{2}$ hours, in No. 5 in 10 hours, in No. 6 in 11 hours, in No. 7 in $13\frac{1}{2}$ hours, in No. 8 in 15 hours, in No. 9 in 15 hours, in No. 10 in $15\frac{1}{2}$ hours, in No. 11 in 16 hours, in No. 12 in 17 hours, in No. 13 in $17\frac{1}{2}$ hours, in No. 14 in 18 hours, in No. 15 in about 19 hours, in No. 16 in 23 hours, in No. 17 in 24 hours, in

No. 18 in 28 hours, in No. 19 in 34 hours, in No. 20 in 43 hours, in No. 21 in 45 hours, in No. 22 in 45 hours, in No. 23 in 55 hours, in No. 24 in $4\frac{1}{2}$ days, in No. 25 in $4\frac{1}{2}$ days, in No. 26 in 6 days.

In the twenty three primary reaction-cases, death occurred in No. 27 in 14 hours, in No. 28 in 30 hours, in No. 29 in $27\frac{1}{2}$ hours, in No. 30 in 30 hours, in No. 31 in 40 hours, in No. 32 in 4 days, in No. 36 in 5 days, in No. 37 in 9 days, in No. 38 in about 15 days, in No. 39 in 15 days, in No. 40 in 8 days, in No. 41 in 69 hours; in No. 42 in $86\frac{1}{2}$ hours, in No. 43 in 5 days, in No. 44 in 130 hours, in No. 45 in 6 days, in No. 46 in 6 days and 9 hours, in No. 47 in about 7 days, in No. 48 in 8 days, in No. 49 in $13\frac{1}{2}$ days, in No. 50 in 17 days, in No. 51 in 26 days and $4\frac{1}{2}$ hours, in No. 52 in 15 days and 3 hours.

Of these, twenty-three deaths during the third stage, the first two were due to pulmonary embolism, the next three to pulmonary congestion and embolism combined, the next one to gastro-enteritis and pulmonary congestion, the next four to secondary diarrhoea and exhaustion, the next one to delirium and exhaustion, the next eight to uræmic coma, the next three to uræmic dysentery, and the last one to fever during convalescence.

In the eleven intercurrent cases, death occurred in the two exhaustion ones, in No. 55 in $5\frac{1}{2}$ days, and in No. 56 in about $6\frac{1}{2}$ days: in the five collapse ones, in No. 53 in 33 hours, in No. 57 in 14 hours, in No. 58 in $13\frac{1}{2}$ hours, in No. 59 in 17 hours, in No. 60 in 29 hours: and in the four reaction ones, in No. 54 from uræmic coma in 8 days, in No. 61 from asthenia in $11\frac{1}{2}$ days, in No. 62 in 19 days, and in No. 63 in 5 days and 3 hours.

To briefly recapitulate, the account will stand thus:—

CHOLERA DEATHS.

<i>Primary.</i>			<i>Intercurrent.</i>		
1 Exhaustion	...	3.	4 Exhaustion	...	3.
2 Collapse	...	26.	5 Collapse	...	5.
3 Reaction	...	23.	6 Reaction	...	4.
<hr/>			<hr/>		
Total	...	52.	Total	...	11.

Grand Total 63

This is not intended to give the percentage proportions of these deaths; for the sixty-three cases have been taken at random out of more than 700 deaths, and to get their true proportions the whole of these must be analysed, which has not been done.

I shall proceed now to relate the morbid appearances and their pathological explanations. In this I shall keep very much to the arrangement indicated in the preceding summary, and furnish particulars which have not been as yet prominently referred to.

First, I have to draw attention to the deaths in the *first stage*. The stage of these cases was not determined by their duration, for that exceeded that of deaths in the second stage; it was inferred from the symptoms presented during life. These symptoms have been already sketched, and do not require here further notice. From the comparative paucity of deaths and frequency of recoveries in the first stage, authors are not unfrequently mistaken regarding its nature. And so cases of recovery during the first stage have been returned under the head of mild cholera, cholérine, or diarrhœa; while the deaths have been confounded with those

from collapse, and reaction. For such errors there is no occasion, if we philosophically study the disease. They seem to me to have arisen from a complete misapprehension of it. The disease being supposed to be due to a poison introduced from without, and likened to the small-pox, the various stages of the latter were to find their counterpart in the former if it were to be true cholera. But if any of those stages were wanting, it was no longer cholera, but diarrhœa or something else. That line of argument carries on its face its own condemnation. As well might we say that a pleurisy was no pleurisy, because nothing further was found after the grazing or rubbing friction sound, or a pneumonia was no pneumonia, because it had not advanced beyond the stage characterized by the fine crepitant rhonchus and rusty-coloured sputum. The idea is absurd; but it is the natural result of assuming that cholera was due to a poison analogous to the virus of small-pox or measles, which must run its course, and be eliminated in its own time.

If that doctrine were correct, it would necessarily follow that it is wrong to attempt to check the disease, and when we are successful in doing so, we only prevent the elimination of the poison, and so jeopardize the life of our patient. *But that doctrine is not correct; cholera is not due to any poison introduced from without; it arises from a peculiar condition of the atmosphere which causes a catarrh of the alimentary tract, which, according to circumstances, may terminate in the first stage, or pass on to the second, and then terminate or be followed by the third.* The atmosphere makes an impression upon the peripheral nerves; that impression sets up within the body morbid action; and that action is directed to the mucous membrane of the alimentary canal. In this there is nothing more wonderful than what may be

seen in catarrhal inflammations of the pleura or substance of the lungs, or in rheumatic inflammation of the joints and heart. These actions are analogous, but not identical; and so their seats and phenomena are different.

If it be urged that cholera is infectious, of which there is a reasonable doubt, it has not been shown that it is more so than common catarrh* or influenza†. It is known also that epidemic catarrh or influenza frequently precedes or accompanies an outbreak of cholera.

The morbid appearances observed in the three deaths in the first stage were as follows :—

In case No. 33, the mucous membrane of the ileum and large intestine was of a pale-rose colour; the solitary glands were prominent. The pericardium contained about half an ounce of fluid; clots were found in both the ventricles and the pulmonary artery. The lungs were good. The liver, spleen, and kidneys were congested; the gall-bladder was full; the tubules of the kidneys yielded on pressure a white milky juice.

In case No. 34, the intestines and other organs are noted to have been congested.

In case No 35, the mucous membrane of the small intestines was here and there congested; of the large uniformly from the cæcum to the rectum without any ulceration. The right lung was adherent to the parietes by old false membranes and slightly hepatized, yielding on section a frothy serum; the left was healthy. Other organs good.

* See Hyde Salter on Catarrh.

† See E. A. Parkes on Influenza, Reynold's System of Med. Vol. I.

In all the three cases, the intestines were congested, and in the first, besides, the solitary glands were prominent. There was, therefore, sufficient lesion to account for the continued purging, which pulled down the strength and brought on exhaustion.

There was, moreover, in the first case evidence of desquamation of the renal epithelium and congestion, and congestion of the liver and spleen, and fluid in the pericardium; in the second, congestion of other organs: and in the third, old disease of the right pleura, and partial hepatization of the right lung. These conditions may, no doubt, to a certain extent, have contributed to the fatal issue. The remarkable features about these cases are the maintenance of the pulse until the approach of death, the absence of the usual characters of the collapse, and their long duration.

The first stage, however, is not always prolonged in this manner. It is only when death takes place in this stage that it is thus long. In cases of recovery it is considerably shorter, not lasting at times more than a few hours, while at others it may occupy days. Similarly when it is followed by the next stage its duration varies, as has been already pointed out in the first part of this paper.

Secondly, I shall state the morbid appearances met with in deaths in the *second stage*. These in the twenty-six cases described were as follows :—

1. *Alimentary Canal.* The mucous membrane was congested, more or less, in every one of the twenty-six cases, the congestion extending from the stomach to the large intestine continuously or in patches of different length; in case No. 25 in the large intestine it was covered with a

granular exudation of the colour of the compound sulphur ointment.

The solitary glands and Peyer's patches were enlarged and prominent in five instances (cases 1, 4, 11, 20, 24;) in one case (1st.) the solitary glands were alone affected, in the remaining four along with the Peyer's patches. In case 4th, some of the solitary glands were ulcerated in the large intestine; in case 20th, some were raised into vesicles, and some ulcerated; and in case 11th, they were solid and buff-coloured throughout, mostly imbedded in a mesh-work of congested blood-vessels. In case 24th, the solitary glands of the large intestine were not affected. In case 20th, three round worms were found in the small intestine.

2. *Kidneys.* Congestion of the substance was noticed in twenty-one cases, (1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 26.) In case 6th, the kidneys were said to be healthy, in No. 12 disorganized, in No. 19 subjects of epithelial desquamation, in No. 24 not examined.

Desquamation of the epithelium of the uriniferous tubules was noticed in seven cases (1, 7, 15, 17, 18, 19, 25.)

Bright's disease was noticed in two cases (12, 25.)

The urinary bladder, which is always empty in the second stage, was noted to be so only in one case (15.)

3. *Lungs.* Congestion of the substance was noticed in fourteen cases (1, 2, 3, 7, 11, 12, 15, 16, 17, 18, 19, 22, 23, 25.)

Gangrene of the substance in two cases (6, 21.)

Old pleuritic adhesions in two cases (16, 25.)

4. *Heart.* The right cavities contained dark blood, fluid or clotted, in thirteen cases (2, 7, 12, 13, 14, 15, 16, 17, 18; 19, 21, 22, 23.)

The left cavities in five cases (12, 15, 16, 17, 19.)

The pulmonary artery treacly blood in case 7th, and a fibrinous coagulum in case 16th.

5. *Liver.* Congestion of the substance was noticed in nine cases (2, 3, 9, 13, 15, 16, 17, 20, 23.) Atrophy in one, and tumours on the left lobe in one.

The gall-bladder was distended with bile in five cases (14, 16, 23, 26.) It was empty in two cases (5, 13.)

6. *Spleen.* Congestion of the substance was noticed in six cases (2, 3, 5, 12, 16, 17.) Induration in one (18.) Atrophy in six (1, 15, 19, 21, 23, 26.)

7. *Brain.* Congestion of the substance and meninges was noticed in two cases (16, 22.)

From the preceding summary it appears that the mucous membrane of the alimentary canal, as in the first stage, was congested more or less in every instance in the second stage, and in one case it was actually covered with an exudation. It was, therefore, in a state of catarrhal inflammation, much as we find it in the air-passages in bronchial catarrh. In bronchial catarrh there is an abundant secretion of mucus largely diluted with water containing salts and albumen. In cholera there is also an abundant secretion of mucus largely diluted with water containing salts and albumen. The difference is one only of quantity and of the description of mucus. The mucus of the respiratory passages is very tenacious, and when mixed thoroughly with water gives it an

oily appearance. The same is the case in the mouth, oesophagus, and stomach. Hence the vomited fluid in cholera resembles the fluid of bronchorrhœa. But the mucus of the small intestines is very different; when concentrated it looks like finely mashed turnips; when diluted with water it produces the characteristic appearance of cholera stools, as I have repeatedly demonstrated in the dead-house. It is not surprising, therefore, that the alvine evacuations are different from the gastric and bronchial, and that the two latter are alike.

The argument thus derived from the condition of the mucous membrane and the enormous amount of secretion, is further confirmed by the state of the solitary glands and Peyer's patches, which in five cases were found swollen and prominent, in one of them being further raised into vesicles in part and in part ulcerated, in another ulcerated, and in a third filled with a solid material.

The importance to be attached to these appearances will be still better appreciated when it is remembered that they were presented by cases of death occurring in periods varying from seven hours to six days from the onset of the disease; and that they were often found at a considerable distance down the intestines, while the stomach, into which all medicines went first, was actually natural or comparatively little affected.

That the disease seems to run a certain course before it is arrested is nothing against this inference; for so does a common cold or bronchial catarrh.

The inflammatory symptoms are generally slight in both cases, but at times run high and give rise to characteristic exudation and textural changes.

In both when the discharge is profuse there is great debility, although in cholera it is infinitely greater than in bronchial catarrh.

From the great loss of water and the inspissation of the blood, the circulation naturally becomes impeded throughout the system, and the internal organs might hence be expected to be all equally affected in the second stage of cholera. Yet the alimentary canal seems to be the only organ invariably affected, and the next in frequency the kidneys.

Out of the twenty-six cases the kidneys were noticed to be diseased in twenty-four. In one they were not examined at all, and in another they are said to have been healthy, although evidently not carefully explored. In twenty-two out of the twenty-four diseased, they were more or less congested, and of these, six had also desquamation of their epithelium. Of the remaining two, one had simply desquamation of the epithelium, and one was quite disorganised.

The kidneys appear, therefore, to have a great tendency to be congested, and very often also to suffer desquamation of the epithelium in the uriniferous tubules, in the second stage, unless previously diseased. Whether previously diseased or affected during the attack they constitute a great element of danger. This danger does not, however, influence the issue of the second stage. So long as the discharges from the stomach and the bowels continue free, they in a manner compensate for the non-secretion of urine.

But during the depth of the collapse, there is so little force in the circulation and so little action going on, that small indeed must be the risk of uræmic poisoning of the blood. The danger is hence merely prospective in the third stage.

when the reaction having occurred, the non-secretion of urine is a warning of the risk of urea accumulating in the blood, unless eliminated by purging and vomiting.

The third in frequency and importance are affections of the lungs. These were congested in fourteen out of the twenty-six cases. Of these two had old pleuritic adhesions. In two cases the lungs were gangrenous. Consequently, altogether, sixteen out of the twenty-six cases had disease of the lungs. Of the remainder in one instance the condition of the lungs was not described at all. The presence of congestion in more than one-half of the cases, is a fatal blow to the theory of Dr. George Johnson, who maintains that the lungs are always anæmic in the stage of collapse, because there is spasm of the pulmonary capillaries. The gangrene was evidently recent, if not *post mortem*.

The fourth in importance, as might have been expected are the conditions of the heart. The right cavities contained dark blood, fluid or clotted, in thirteen cases. In five of these, the left cavities also contained similar blood; and the pulmonary artery in one contained a treacle-like blood, and in another a fibrinous coagulum. In one case the heart was not examined at all. Therefore in exactly one-half of the cases the right cavities were full of blood, and in about a quarter likewise the left cavities.

Here again Dr. Johnson's theory is evidently shaken. If it be true that in the collapse there is a spasmodic closure of the smaller branches of the pulmonary artery impeding the flow of blood through the lungs and causing its accumulation in the right side of the heart, why should there have been such accumulation in only one-half of the cases, and why in nearly

one-half of these again should the blood have been found also in the left cavities ?

These facts serve to prove that although the blood is dark, thick, and viscid in the second stage, still it moves on however slowly ; that from this slow motion through the pulmonary capillaries there is an accumulation in the lungs and the right cavities of the heart ; that nevertheless it continues to flow into the left cavities, and thence into the systemic vessels. Were it otherwise life must have been extinct as soon as there was no circulation through the lungs. If the cholera-poison caused spasmodic closure of the branches of the pulmonary artery, there is no reason whatever why it should affect them in different degrees and in a gradual manner. And if this closure were a fact, how account for the lungs being congested in some and unaffected in others ? The only inference remaining to be drawn is that Dr. Johnson is wrong.

The treacle-like condition of the blood in one case, and the actual presence of a fibrinous coagulum in another, in the pulmonary artery, are indications of another source of danger which becomes seriously developed in the third stage.

The fifth in importance are the morbid appearances presented by the liver. This organ was congested in nine cases, atrophied in one, and indurated and occupied by tumors in one. In one case it was not examined at all. Consequently in more than one-third of the cases the liver was diseased, and in the vast majority of them congested. The gall-bladder contained bile in five cases, and was empty in two. In the rest its condition was not noted.

A very curious fact which becomes evident from the foregoing remarks, is that the organs which suffer congestion, in the second stage of cholera are, next to the alimentary canal, the kidneys, lungs, and liver, in the order in which they are placed here, and all having some kind of portal circulation, *i. e.*, deriving the blood necessary to their functions from a venous source.

The spleen was congested in six cases, indurated in one, and atrophied in six. The two former conditions were due to previous disease, and the last is the only one normal to the second stage of cholera.

The brain and its meninges were noticed to be congested in only two cases. The normal condition of these structures in the second stage of cholera is, therefore, also not to be affected, and this we might have anticipated from the continued clearness of the mind.

It follows hence that the second stage of cholera, although so peculiar in its vital manifestations, presents little or nothing anatomically different from the first stage, and yet sufficient to explain every symptom met with during life.

Thirdly, I shall state the morbid appearances in the twenty-three cases of death during the third stage or reaction of primary cholera.

1. *Alimentary Canal.* The peritoneum and omentum were congested in one case (40.) The great omentum was atrophied, black, and adherent to the urinary bladder in one case (45.)

The mucous membrane was congested, more or less, in twenty cases. (27, 28, 29, 30, 31, 32, 36, 37, 38, 39, 40, 41, 42, 43, 46, 47, 48, 49, 50, 51.)

In three of these it was deeply inflamed and covered with a layer of exudation (32, 49, 50.)

Black patches, due to dead portions of the submucous cellular tissue, were found in the colon in one case (30.)

Chronic thickening of the mucous membrane was present in two cases (51, 52.) in the large intestine.

Ulcers of the large intestine were found in four cases (49, 50, 51, 52.)

The solitary glands were affected in seven cases (28, 29, 30, 46, 49, 50, 51.)

The Peyer's patches were affected in three cases (28, 30, 50.)

Round worms were present in three cases (29, 31, 44.)

2. *Kidneys.* Congestion of the substance was found in twelve cases (27, 28, 30, 38, 40, 42, 44, 45, 46, 49, 50, 52.) In three cases (43, 47, 48,) they were not examined.

Desquamation of the epithelium of the tubuli uriniferi was present in ten cases (27, 28, 30, 37, 38, 42, 44, 45, 46, 50.)

Fatty or granular degeneration existed in five cases (28, 30, 41, 44, 50.)

Urinary cysts in one case (28.) Calculus in the pelvis in one (41.)

The urinary bladder, shrunk, contained a little milky fluid in two cases (30, 40.)

3. *Lungs.* Congestion of the substance was found in fifteen cases (27, 28, 29, 30, 31, 32, 36, 38, 42, 43, 44, 46, 47, 49, 50.)

Partial hepatization in two cases (30, 47.)

Emphysema in one case (28.)

Old pleuritic adhesions in two cases (28, 31.)

Embolism of the small blood-vessels in two cases (29, 30.)

4. *Heart.* The right cavities contained blood in four cases (38, 40, 43, 44); and clots in seven cases (27, 28, 29, 30, 40, 42, 46.)

The left cavities contained blood in two cases (40, 44); and clots in three cases (40, 42, 46.)

The pulmonary arteries contained blood in three cases (27, 28, 29); and clots in two cases (29, 30.)

5. *Liver.* Congestion of the substance was found in eleven cases. In seven of them it was portal (27, 28, 31, 38, 42, 43, 49); and in four hepatic (29, 30, 44, 48.)

Atrophy in one case (37.) Cirrhosis in one (52.)

The gall-bladder contained bile in six cases (29, 30, 39, 40, 42, 44.)

6. *Spleen.* Congestion of the substance was found in one case (38.) Atrophy in five cases (29, 30, 32, 37, 48.)

7. *Brain.* The sinuses were full of blood in one case (46.)

The meninges were congested in three cases (40, 44, 46.)

The surface was covered with serum in four cases (28, 29, 30, 36); with lymph in one case (46.)

The ventricles contained serum in two cases (42, 46.)

The substance was congested in six cases (29, 30, 40, 42, 44, 49.)

It was not examined in three cases (43, 47, 48.)

From the preceding summary it would appear that the alimentary canal was more or less affected in every one of the twenty-three cases. Out of these in one (44) the lesion consisted only in the presence of a great number of round worms; in another (45) of chronic inflammation of the great omentum; and in a third (52) of chronic thickening and ulceration of the large intestine.

Of the remaining twenty, the mucous membrane was more or less congested in every case, and in three of them, moreover, vividly inflamed and lined with lymph. Here again there was evidence of inflammatory action in the alimentary canal, although in the greater number of the cases traces only remained of a by-gone state.

This was still further proved by the affection of the solitary glands in seven cases, of the Peyer's patches in three, by the ulcers in four, and thickening in two.

Death, however, did not always arise from disease of the alimentary canal. In only seven of the twenty-three cases could it be directly connected with that organ; four of them being due to secondary diarrhoea, and three to uræmic dysentery, affections which seem to depend more or less on failure of the action of the kidneys.

The kidneys were diseased in fourteen cases; in three their condition was not examined. In much more than one-half of the twenty-three cases, therefore, the kidneys were found wrong. Of these fourteen, congestion of the renal substance

was present in twelve, and absent in two; desquamation of the epithelium was present in ten (in one without congestion,) and absent in three; fatty or granular degeneration was present in five (along with congestion and epithelial desquamation,) and absent in nine; (calculus in one;) and urinary cysts were present in only one case along with all the three previous lesions. In all the fourteen cases there were lesions also of the alimentary canal, but only in eleven congestion of the mucous membrane, in one thickening and ulceration without congestion, in one disease of the omentum, and in one round worms in the bowels.

Out of these fourteen cases, death occurred in two from pulmonary embolism, in one from pulmonary congestion and embolism combined, in two from secondary diarrhoea, in one from delirium, in five from uræmic coma, in two from uræmic dysentery, and in one from fever during convalescence. In none was it directly due to the kidneys. The three in which the kidneys were not examined (43, 47, 48,) were cases of death from uræmic coma.

The lungs were diseased in fifteen cases. In every one of them they were congested; besides, in two partially hepatized, in one emphysematous; in two had old pleuritic adhesions; and in two their small blood-vessels were in a state of embolism. In seven cases they were either not examined (6), or found to be healthy (1).

Of these fifteen, death occurred in two from pulmonary embolism, in three from pulmonary congestion and embolism combined, in one from pulmonary congestion, in two from secondary diarrhoea, in five from uræmic coma, and in two from uræmic dysentery. So that in six cases only

the deaths were traceable to lesions in the lungs, or affecting them in any way.

The heart contained blood or clots in ten cases; blood in both the right and left cavities in two, only in the right cavities in two, in the pulmonary artery only in three; clots in both the right and left cavities in three, in only the right cavities in two, and in the right cavities and pulmonary artery in two.

Of these ten cases, death occurred in two from pulmonary embolism, in two from pulmonary congestion and embolism combined, in one from secondary diarrhoea, in one from delirium, and in four from uræmic coma. In four of these cases, therefore, was the heart in any way concerned with the death, *i. e.*, in those of pulmonary congestion and pulmonary embolism.

In the two cases of pulmonary embolism, the blood in the pulmonary artery was thick, black, and tarry, while the right cavities of the heart were blocked up with fibrinous coagula. The thick blood, therefore, must have failed to pass through the pulmonary capillaries, and, being stagnant behind that point, the coagula had formed in the right cavities of the heart. It is a singular fact, too, that in both those cases there was desquamation of the renal epithelium, and, therefore, Bright's disease of the kidneys. Could that circumstance have any influence in imparting to the blood an increased tendency to coagulation on the occurrence of reaction? In these cases, the capillaries being empty, the air-cells are not much pressed upon, and are filled and emptied in inspiration and expiration much as usual, or even with greater force.

In pulmonary congestion, on the contrary, the capillaries themselves are distended with blood, and the pulmonary air-cells compressed in proportion to the extent of that congestion. The capacity for the admission of air in inspiration is hence greatly diminished, and the respiratory sounds are accordingly considerably weakened or abolished. In the course of such congestion clots are apt to form in the branches and main trunk of the pulmonary artery, and the right side of the heart. Then the lesions caused by both may be present. Such was the case in the deaths which have been ascribed to a mixture of these conditions, while in one instance death was directly due to simple congestion. In one only of the mixed cases was there any disease of the kidneys; consequently the influence of renal affection in promoting pulmonary congestion is by no means made out. Further enquiries may, perhaps, show some connection between them.

The liver was diseased in thirteen cases. Out of these, congestion of the substance was present in eleven, (seven portal, four hepatic); atrophy in one, and cirrhosis in one.

The gall-bladder contained bile in six cases; in only one of these there was portal congestion, in three hepatic congestion, and in two no congestion of any kind or other disease of the liver. In sixteen cases there was either no bile in the gall-bladder, or no note taken of its presence. In the six cases mentioned, it seemed to be more frequently associated with the simple hepatic than portal congestion, or no affection at all. In none of these cases was death directly or indirectly due to disease of the liver.

The spleen was affected in only six cases, in one congested, and in five atrophied; in the remaining seventeen it

was quite healthy. In no case did death seem to proceed from its condition.

The brain was more or less diseased in nine cases, and in three it was not examined. Out of the nine, in two there was only effusion of serum on the surface, in two effusion of serum on the surface and congestion of the substance, in two congestion of the meninges and substance, in one congestion of the substance and effusion of serum into the ventricles, in one congestion of the meninges, effusion of lymph under them, engorgement of the sinuses, and effusion of serum into the ventricles, and only congestion of the substance in one.

In these nine cases, death occurred in one from pulmonary embolism, in two from pulmonary congestion and embolism combined, in one from secondary diarrhoea, in one from delirium, in three from uræmic coma, and in one from uræmic dysentery.

In four cases, therefore, out of the nine, death was directly due to head affections.

In seven cases out of the nine, the kidneys were diseased. They were diseased in all the four deaths from head affections above referred to, in one only congested, and in three congested and subjects of Bright's disease.

The three cases in which the head was not examined were the same in which the kidneys were not examined, and in which death occurred from uræmic coma. It is very probable, however, that in all of them both the head and the kidneys were the seat of disease.

It seems very reasonable, therefore, to infer that the suppression of urine in the third stage of cholera is due to actual

disease of the kidneys, pre-existing or newly induced, and that the consequent retention of urea in the blood is the cause of delirium, coma, diarrhoea, dysentery, and several other affections. Even in the case, which died of fever during the convalescence from cholera, congestion of the kidneys co-existed with cirrhosis of the liver, and chronic thickening and ulceration of the rectum.

I shall now proceed to the intercurrent cases, and state their morbid appearances in the order in which the primary ones have been described.

First, in deaths in the first stage in the two cases, the alimentary canal was congested in two (55, 56), ulcerated in two (55, 56), of a dark colour in one (56), had cicatrices in two (55, 56); the kidneys were granular in one (56), hypertrophied in one (55); the lungs were congested in two (55, 56), had tubercles in two (55, 56), and cavities in two (55, 56); the heart contained blood in the left ventricle in one (55), and fluid in the pericardium in one (55); the liver had chronic capsulitis and adhesion in one (55); and the urinary bladder was distended with urine in one (55).

Secondly, in deaths in the second stage in the five cases, the alimentary canal was congested in two (54, 62), ulcerated in two (57, 60), sloughing in one (57), adherent in one (57), was connected with an abdominal abscess in one (57.); the solitary glands were tuberculous in one (60.); and the Peyer's patches were tuberculous in one (60); the kidneys were congested in one (53); the lungs were congested in two (53, 59), hepatized in one (59.) tuberculous in two (59, 60), had cavities in two (59, 60); the pleura contained effusion in two (59, 60), and was adherent in two

(59, 60); the liver was congested in two, had an abscess in one; the spleen was congested in one.

Thirdly, in deaths in the third stage in the four cases, the alimentary canal was congested in two (54, 62); the kidneys were granular in two (54, 62); hypertrophied in one (54), had epithelial desquamation in three (54, 62, 63); urinary cysts in one (54), atrophy and distortion in one (54); the lungs were anæmic in one (54), tuberculous in two (61, 63); had cavities in one (61); old adhesions in one (61); the right pleura had empyema in one (63), the left pleura recent lymph in two (62, 63); the heart had fluid blood in the right ventricle in two (54, 63); fibrinous coagulum in one (63), blood in the left ventricle in one (63), the meninges of the brain were congested in one (54), and the substance congested in one (54).

In one of the two cases in which cholera was intercurrent to diarrhoea death occurred from collapse, and in the other from uræmic coma; in two of the three cases in which it was intercurrent to dysentery death occurred from exhaustion, and in the third from collapse: in the only case in which it was intercurrent to hepatic abscess death occurred from collapse; in two of the four cases in which it was intercurrent to phthisis death occurred from collapse, in a third from asthenia during the convalescence, and in the fourth from pleuro-pneumonia during reaction.

These eleven are, however, only a fraction of the cases in which cholera is intercurrent to other diseases, as will be perceived by a reference to the first part of this paper and the clinical histories, many of which revealed the existence of previous disease of some kind, though not rapidly fatal. Other cases which I could have adduced as examples of this

intercurrence I have been forced to keep back by considerations of space; but I think the few I have given will suffice to illustrate the subject. They show that, while diarrhoea in some cases precedes cholera, there are other diseases which do the same, and might as reasonably be called premonitory to it. This, therefore, does away with the so-called premonitory stage, which writers talk so much about, but practitioners seldom discover till too late to serve any useful purpose. It also shows that many persons who die from cholera would die nearly as soon if not attacked by it.

VI. *Diagnosis.* The diagnosis of cholera requires an intimate acquaintance with the symptoms and morbid appearances of its three stages as described in the preceding pages. It is not alone sufficient to distinguish cholera from other diseases; to the medical practitioner it is of the last importance to be able to know also the stages from one another, for that knowledge is necessary to the proper treatment of the case.

The phenomena of cholera are so peculiar that, there is small danger of mistakes as to the true nature of the disease. The only maladies with which it could be at all confounded are diarrhoea, dysentery, and gastro-enteritis: but they are all soon set aside by the character of the evacuations from the stomach and bowels, the advent of cramps, and other symptoms, which have been fully detailed in the former part of this paper.

The characteristic symptoms of the three stages have also been described, as well as the special symptoms indicating the approach of exhaustion, pulmonary embolism, pulmonary congestion, gastro-enteritis, secondary diarrhoea, uræmic dysentery, delirium, coma, convulsion, fever, &c. I shall not,

therefore, dwell upon them again, but content myself merely with referring the reader to what has been already written above, and impressing upon him the necessity of paying particular attention to them, and making himself thoroughly conversant with their distinguishing marks.

VII. Prognosis. When the high mortality of cholera is remembered, the prognosis in every case must be considered to be very serious. For instance, in my own hospital practice the mortality during one four years from 1850 was 41.592 per cent.; and during another four years from 1860, 47.943 per cent.; the average mortality for the whole being 46.61 per cent. This is still considerably lower than in the practice of many others. The mortality, again, varies according to the period of the epidemic, at the commencement rising as high as 75 per cent., and towards the end sinking as low as 25 per cent.

Nevertheless a prognosis can be arrived at with tolerable certainty nearly in all cases, and is always required by the patient or his friends. It is discreditable to the profession to expose its helplessness, especially if a rational conclusion can be formed not surrounded by more than ordinary doubts, absolute certainty being seldom attainable in matters of this kind.

Such a prognosis can be made out by a careful consideration of the previous history and present symptoms.

If the previous history show the existence of general bad health, or disease of important organs (kidneys, skin, bowels, lungs, heart, spleen, liver, brain), the prognosis is very unfavourable, and the patient will probably die in either of the three stages, though more probably in the first or second.

If the previous health have been good, then there is one element of danger less, and so far the prognosis is more favourable.

If the first stage be not past and the symptoms few and mild, the prognosis is more favourable than if the case have already entered the second stage.

If the second stage have occurred and the symptoms are severe, the danger is imminent: but if the symptoms are mild or have been succeeded by a lull, there is more hope for the patient.

As soon as the reaction has set in, and the pulse and animal heat have returned, the danger of death is considerably diminished. But if there have been previous organic disease it is still very great; or it may now acquire fresh elements of strength from secondary causes. These secondary causes manifest themselves by suppression of urine, dyspnoea, restlessness, hiccup, vomiting, diarrhoea, dysentery, delirium, coma, convulsions, fever, exhaustion, asthenia, sloughing, &c. Whenever such causes have become developed, the danger to life is very imminent, and so the prognosis very unfavourable.

From first to last, therefore, a case of cholera is beset with danger, and until every vestige of the disease has disappeared, and the various organs resumed their wonted functions, no absolute safety can be guaranteed.

VIII. Treatment. In stating the clinical history of cholera, I have given also a brief account of the treatment in each case for two reasons—first, to illustrate the practice adopted in my ward; secondly, to satisfy sceptics as to its influence upon the morbid appearances.

The treatment employed in my cases does not always depend upon myself. According to a standing rule every cholera patient applying for assistance, is at once admitted into the hospital and immediately attended to; for, if it were not so, many cases would expire on the threshold, and be practically debarred from medical aid. During the cholera season, the daily admissions from cholera are very numerous, and take place at all hours of the day. Hence some persons are required to be always on duty, and a system exists by which the subordinate officers arrange to have one of them always present, and a certain number of students under him. Owing to the great pressure on him, the Sub-Assistant Surgeon cannot attend himself to every case in a large Institution like the Medical College Hospital. Consequently the duty of prescribing for cholera patients very often devolves upon young students, and not unfrequently death has closed the scene before the hour arrives for my own visit. It is often, therefore, only in cases where life is prolonged for some hours that they are treated by me. Nevertheless, on the whole, the treatment is usually founded upon the principles known to be followed by me or my colleagues. I have entered into all this explanation to enable the reader to understand any occasional laxity he might notice in perusing these cases.

In the vast majority of patients the first stage is long gone by before their admission, and the treatment has to commence in the cold stage. It is in very rare cases only that admissions take place in the first stage, and an opportunity is afforded for beginning the treatment in that stage. Therefore, in hospital practice the rule cannot be decided by numbers alone, people preferring to remain in their own houses until with the end of the first stage all hope of

an easy cure is gone by, and only then resorting to the hospital. In private practice it is usually otherwise; the parties being richer can command the services of a medical practitioner, and send for him on the slightest alarm. Here the treatment often begins in the first stage, and is attended with the greatest success.

From the knowledge of this fact, as well as the symptomatic and pathological distinctions already pointed out, I shall arrange my remarks on the treatment of cholera according to its stages, instead of following the common practice of the hospital.

Treatment of the First Stage. As soon as this stage is announced by its characteristic symptoms, purging, vomiting, or both, a large mustard plaster should be applied to the abdomen, and kept on for half an hour or three quarters after it has commenced to smart. This acts as a counter irritant to the catarrhal inflammation of the stomach and intestines, and thereby tends to check the vomiting and purging. Its application should not be delayed till the occurrence of cramps, for much valuable time is thus lost without any benefit whatever, and with much increase of risk to the sufferer. But if cramps should have already come on, the mustard plaster should still be applied, for the pathological condition of the alimentary canal needs it now even more.

The first vomiting and purging having cleared away any undigested food and fæcal accumulation, some medicines must be given internally to check the great drain, and to allay the irritation. This may be accomplished in several ways.

1. *Opiates.* The preparations of opium hold the first rank among the remedies for cholera in its first stage. To my

own knowledge, when administered sufficiently early and in full doses, it has proved more frequently successful than any other drug in the Pharmacopœia. It allays the irritation of the stomach and intestine, checks the vomiting and purging by its property of arresting the processes of endosmose and exosmose through animal membranes, prevents the waste of tissue, produces an agreeable warmth by its stimulant operation, removes the sense of languor, promotes perspiration, and induces sleep from which the patient awakes refreshed and composed. From this moment there may be no further trouble in the case, and a rapid recovery be the result. Every practitioner of experience has witnessed this, and it is fully explained by the morbid appearances which characterise this stage.

The opium may be given in the form of pill, powder, or solution. The pill takes the longest time to act, and next to it the powder, and the solution the least. Pills, when old, are apt to be hard and to require a very long time for solution; therefore, if given at all, they should be fresh prepared. The powder is more readily dissolved, and preferable to pills. The solution may be aqueous or alcoholic. In either of these forms it may be given alone, or in combination with other medicines as will presently appear. One to two grains of solid or powdered opium, or twenty to thirty minims of laudanum may generally be used as a full dose for an adult.

The fear of inducing coma by giving opium in the first stage of cholera is an unmeaning bugbear. The coma in cholera is due to uræmia in the third stage, and need not be apprehended in the first, unless the drug be administered in poisonous doses. Provided the remedy be used with a full

knowledge of its action and of the susceptibility of different ages and constitutions, nothing more is required than the caution of discontinuing it in the collapse and reaction.

2. *Astringents.* The astringents are employed with the direct object of checking the gastric and alvine discharges. Some of them, however, act also in other ways as will be presently explained.

The astringents preferred for this purpose are either mineral or vegetable, acids or salts, or parts of plants containing them.

Thus chalk, alum, acetate of lead, nitrate of silver, sulphate of zinc, sulphate of copper, sulphuric acid, nitric acid, nitro-hydrochloric acid, hydrochloric acid, acetic acid, tannic acid, gallic acid, kino, catechu, rhatany, nutgall, logwood, babul, pomegranate-rind, oak-bark, &c., have all their advocates, and may all prove useful at times.

Chalk is recommended for its absorbent and antacid properties, alum for its astringency, acetate of lead for being astringent and vascular sedative, nitrate of silver for its astringency and power of controlling inflammations, sulphates of zinc and copper for their astringency, sulphuric, nitric, hydrochloric, nitro-hydrochloric, and acetic acids for their astringency and alterative action, tannic and gallic acids and the vegetable substances containing them, for their simple astringency.

I have tried them all and found them nearly equally serviceable. On the whole, I have come now to prefer the chalk mixture, as it can be given every hour or every two hours without any harm whatever, and with as much good as anything else.

Sometimes opium, or one of its preparations, is combined with an astringent with great benefit. Thus aromatic chalk powder with opium ; kino or catechu with opium ; alum, acetate of lead, nitrate of silver, sulphate of zinc, or sulphate of copper, with opium, sulphuric, nitric, nitro-hydrochloric, hydrochloric, acetic, tannic, or gallic acid with opium, may be used in this way.

Sometimes two or more astringents are combined in the same prescription. Thus chalk and kino or catechu or log-wood, alum and catechu, acetate of lead and acetic acid, sulphuric and gallic or tannic acids, are joined together in this manner. Sometimes, again, opium or morphia is added to such compounds according to the circumstances of the case.

3. *Mercurials*. Large doses of calomel (20 or 30 grs.) are often used. They allay the gastric irritation by their local sedative action. Sometimes smaller doses are used with opium to combine the double action of opium and mercury. Blue-pill and opium, and hydrargyrum cum creta and opium are also employed with a similar view. One grain of opium and four grains of calomel, or five grains of blue-pill, make an excellent prescription ; two of such pills may be given with advantage in the first stage of cholera before any other medicine.

4. *Sulphur*. Sulphur was recommended by Dr. Blacklock of Madras as a remedy for this stage, but with doubtful success.

5. *Ipecacuanha*. This drug has been used in France, and is highly spoken of. It is possible that it acts here in the same way as it does in acute dysentery, by its specific influence upon inflammation of the alimentary mucous membrane. It is used in large doses (grs. 20 to grs. 30).

Ipecacuanha may be used also in combination with opium in the form of Dover's powder in grs. x doses with similar advantage.

6. *Black-pepper and assafætida.* The late Dr. Wise of Dacca had a high opinion of black-pepper and assafætida with opium or hyoscyamus as a remedy for cholera, and I have myself often received the highest testimony in favour of its success from Missionary gentlemen in Mofussil stations, who cannot always obtain European medicines.

7. *Stimulants.* Ammonia, ether, and camphor may be used in small doses frequently repeated, when the powers of life are beginning to flag, but not till then. Similarly, musk, brandy, rum, gin, champagne, port-wine, &c., may be employed for a like object. They increase the warmth of the body, restore the pulse, remove spasm, and support the failing strength. They should not, however, be given too soon, nor continued when they seem to cause vomiting or increase of irritation, nor pushed to excess.

8. *Sedatives.* Hydrocyanic acid and chloroform in combination with opium, or chlorodyne, may often operate with success, and are highly esteemed by many practitioners and the public. But tartar emetic or bleeding should never be employed in the treatment of cholera, as they have always appeared to me and others to be highly injurious.

9. *Antiperiodics.* Quinine and arsenic are at best doubtful remedies.

10. *Eliminants.* These are purgatives, emetics, diuretics, cholagogues, and diaphoretics. Their employment is based upon an erroneous theory of the pathology and etiology of

the disease. The advocates of this doctrine urge the administration of croton-oil, castor-oil, salts, and cantharides from the very first, and are not abashed when they find that their cases die more often than those of medical men employing other lines of treatment (!) They are more solicitous about their own reputation than the truth or falsehood of their favorite idea, and so leave no stone unturned to persuade their brother practitioners to follow their dicta. Need I say how greatly they are to be pitied if the pathology set forth in the above pages should turn out to be true, and the treatment founded on it the right one to adopt?

11. *Enemata*. These are generally of an astringent character and the most useful of them is one of the nitrate of silver which controls the inflammation in the lower end of the intestine. Alum, acetate of lead, and sulphate of zinc are also frequently used in this way with advantage in checking the discharge from the bowels. "*Hot saline enemata* were used" by Dr. C. Morehead of Bombay, "but without any effect in lessening the state of collapse." Externally, however, hot and stimulant fomentation to the abdomen is sometimes useful.

12. *Food and drink*. Early in the disease there is little call for food. The thirst, however, is very great, and cold drinks are most acceptable to the patient. Cold water or melted ice, or small pieces of ice, pure or mixed with a little weak brandy, may be given in moderation with great relief, and should not be refused if desired by him. If the first stage be prolonged some food must also be allowed, and it should be liquid, if possible, such as thin sago, arrowroot, barley-gruel, conjee, milk, beef-tea, broth, &c. It should be either hot or cold according to the choice of the patient, and

given about half a cup at a time not oftener than every three hours to allow of its digestion.

13. *Regimen.* The room where the patient lies should, if possible, be large, high, lofty, and freely ventilated. His person should be kept clean and lightly covered, and all soiled linen and dejections should be immediately removed from the apartment. He should be made to keep his bed, and proper attendants should be provided to look after him, and to assist him in his movements.

When cramps come on he will require other external measures, especially friction over the affected parts. This is usually made with ginger powder; but stimulant liniments, such as of camphor or turpentine, may be used instead. Ginger is more useful than these in the second stage when perspiration breaks out on the surface.

Treatment of the Second Stage. When the second stage has commenced, the time for opiates and astringents has gone by. Yet the chalk mixture in one ounce doses may be continued every two hours, without harm, and, sometimes, with positive advantage, if the purging require it. So, likewise, if the vomiting persist, mustard plasters may be applied to the epigastrium, or repeated if they had been applied before. But the great remedy for this stage lies in the employment of stimulants. Thus five grains of carbonate of ammonia or ten minims of the aromatic spirit of ammonia, or ten minims of ether may be given in an ounce of camphor mixture every quarter, half, or three quarters of an hour, or every hour, according to the urgency of the case and the tolerance of the medicine. Sometimes the stomach is so irritable that this mixture is immediately rejected whenever it is swallowed. In such a case it should be discontinued, as the repeated

vomiting debilitates the patient, and can answer no useful end. When the stimulant mixture is not borne, sometimes a little weak brandy and water might be tolerated and should be tried; but brandy should never be given undiluted or in strong doses every half hour or hour. Even should it be kept in the stomach, it very soon depresses the vital powers by its own narcotic action, and so adds a fresh element of danger. The same might be said as regards rum, gin, champagne, port-wine, &c. But frequently the alcoholic fluid, however weak, will be rejected like the stimulant mixture, and then it must also be given up. Musk or *assafœtida* may be tried next, although generally with the same result.

Under these circumstances it may be deemed prudent to discontinue medicines altogether, and to confine the treatment to the exhibition of cold drinks or ice, and of bland liquid food. Such food should be given cold, flavoured with a little salt and lime-juice, if the irritability of the stomach be very great. Otherwise it should be given hot, spiced with carminatives (cinnamon, &c.) and sweetened with sugar, to assist the approach of reaction. It may consist of any of the articles named in the first stage, except milk and broth which are very apt to disagree, and to cause flatulence and hiccup.

But sometimes the symptoms are so threatening that something in the way of medicine must be attempted. Then nothing has appeared to me to succeed so well as a single large dose of calomel, γss for instance. At times it really acts like a charm, and from the moment it is swallowed the vomiting and restlessness cease at once, the stools become coloured and scantier, the heat returns to the surface, and the pulse begins to be felt at the wrist. Had I not witnessed personally

all this while anxiously watching by the sick-bed for hours, I could scarcely have credited its occurrence. But I have seen this, and so I give it as an observed fact. I have never seen any advantage gained by repeating the dose, although much harm.

Along with these measures the whole body should be assiduously rubbed with ginger powder with the fourfold view of relieving the cramps, promoting the circulation, warming the surface, and drying the cold clammy perspiration.

The application of heated bodies to the arm-pits and feet, of warm water and vapour baths, of sheets wrung out of a solution of nitro-muriatic acid, of cold affusion and wet-sheet, of electricity and magnetism, and the inhalation of chloroform and of nascent oxygen from burning chlorate of potash, &c. I have practised myself and heard others recommend; but I have come to entertain no favourable opinion of their efficacy, and to regard their employment as bad practice which most unnecessarily and cruelly tortures the patient. I would apply the same remark to transfusion of blood and the injection of warm saline solutions into the veins, to say nothing of the barbarity of gashing into the flesh to insert into the wounds thus made a few drops of the so-called *tincture of quassia*.

Treatment of the Third Stage. When reaction has fairly set in indicating the third stage of the disease, little need be done by the medical attendant beyond watching the symptoms if all go well; but sometimes, after a temporary pause, the purging and vomiting break out afresh and must be treated. Now the danger of uræmia must be vividly kept in sight, and no opiate prescribed until the excretion of urine is fully re-established. Mustard plasters, blisters, or cupping,

may be applied to the abdomen and loins to check the vomiting and diarrhoea, both of which are now secondary, and more or less connected with the suppression of urine. Non-irritating astringents, such as the chalk mixture, or a mixture made with acetate of lead, dilute acetic acid and water, may be administered to check the diarrhoea; and local sedatives, such as chloroform, dilute hydrocyanic acid, or white bismuth may be given to allay the vomiting. These measures failing, sometimes small doses of calomel and soda, frequently repeated, especially if the tendency to flatulence and tension of the abdominal muscles show the existence of much inflammation, answer most satisfactorily. But if the diarrhoea or vomiting should continue after the urine is properly re-established, opium may be conjoined with either astringents, mercurials, or ipecacuanha with great advantage. Now aromatic powder of chalk with opium, kino with opium, acetate of lead with opium, nitrate of silver with opium, blue-pill with opium, or Dover's powder, may at once stop the diarrhoea; and should dysenteric symptoms have appeared, the same treatment might suffice, or it might be necessary to give ipecacuanha with gum acacia and soda, or in large doses by itself, besides applying turpentine stupes to the abdomen.

The suppression of urine often gives way of itself, but sometimes causes much anxiety, and sometimes, again, never yields at all. It is a symptom of the third stage which requires to be carefully watched. So long as the vomiting or diarrhoea continues, and the mind remains clear, there need be no hurry. If the friends of the patient are over-anxious, a catheter may be passed into the bladder after a reasonable interval, and the appearance of a single drop of clear urine is sufficient to show that nature is at work, and, sooner or later, a full stream will flow. Catheterism should

always be employed if the hypogastrium be dull on percussion, and prominent from retained urine as it sometimes is.

But if no urine be met with at all after repeated explorations, and, if, in the meantime, the purging and vomiting have ceased, much mischief may be apprehended from the retention of urea in the blood. Now dry cupping on the loins, or even taking blood by cupping, or leeches from the same parts may sometimes succeed, and sometimes diuretics may seem to effect the desired object. But at other times all these measures will fail, and then we must be prepared for uræmic convulsions, stupor and coma. For these the head must be shaved, and a blister applied to the vertex or the nape of the neck. At the same time calomel may be given by the mouth, or castor-oil, to create a diversion towards the bowels. This treatment will succeed sometimes, but very often fail, and then I know nothing which can save the patient.

But even when the patient escapes the dangers of exhaustion from vomiting or diarrhœa, and uræmic coma, he may suddenly become delirious and then die. For this delirium little can be done, though opium may be tried as a *dernier resort*.

Pulmonary congestion may be treated by dry cupping on the chest and back, blisters, and stimulants; but generally with small success. Tartar emetic and ipecacuanha are too dangerous in such a case to be thought of.

Pulmonary embolism forebodes sure death, and that death is so speedy that no time is generally left for the adoption of any measures.

The asthenic condition, and boils, abscesses, sloughings, &c., must be treated on the usual principles for these

affections; and so, too, any pre-existing diseases which may have become aggravated during the reaction. For these no new rules require to be laid down. Nor is it necessary to depart from the ordinary principles in the treatment of the fever and cutaneous eruptions, which, in rare cases, become developed during the progress of the convalescence. The fever is not so dangerous as typhus or typhoid; nor can it be compared for a moment in that respect to uræmic coma, convulsions, diarrhoea, dysentery, pulmonary embolism, and pulmonary congestion.

Before concluding the subject of treatment I beg to annex here a rough table of the remedies, so that they may be seen at a glance and consulted without difficulty, and a few prescriptions employed in cholera. Such prescriptions might be multiplied to any extent, but it is more on their rational and discriminate use, than their number that success will really rest.

REMEDIES FOR CHOLERA.

External.	Mustard plasters.
	Ginger friction.
	Stimulant liniments, and fomentation.
	Baths, nitro-muriatic, hot vapour, &c.
	Cupping, and leeches.
	Blisters.
	Heated objects.
	Inhalations of oxygen and chloroform.
	Electricity and magnetism.
	Transfusion of blood and saline injections into the veins.

- Internal. {
1. Opiates. { Pills.
Powders.
Solutions.
 2. Astringents. {

{	Mineral.	{	Chalk.	Sulphuric Acid.
			Alum.	Nitric Acid.
			Lead, Acetate.	Nitro-Hydrochloric Acid.
			Silver, Nitrate.	Hydrochloric Acid.
			Zinc, Sulphate.	
			Copper, Sulphate.	
 3. Mercurials. { Calomel.
Blue-pill.
Hydrarg. c Creta.
 4. Sulphur.
 5. Ipecacuanha.
 6. Hyoscyamus, Black-pepper, and Assafœtida.
 7. Ammonia, Ether, Chloroform, Camphor,
Musk, Gin, Brandy, Rum, Champagne,
Port-Wine, &c.
 - 8 Antiperiodics. Quinine, and Arsenic.
 9. Eliminants. Croton-oil, Castor-oil, Salines,
Cantharides.
 10. Sedatives. Hydrocyanic Acid, Tartar Emetic,
Bleeding.
 11. Enemata, Astringent, hot saline, nutritive.

- Diet. { Drink. Cold water, melted ice.
Food. Slops, (sago, arrowroot, barley, conjee,
milk, beef-tea, broths.)
- Regimen. A large, high, and lofty room, free ventilation,
rest, cleanliness, good conservancy.

PRESCRIPTIONS.

- R Pil. Hydrarg ... gr. v.
Ext. Opil. ... gr. i.
M. ft. pil. i. Two such pills to be taken at once.
- R Extract. Opil. ... gr. i.
Ft. pil. One or two pills to be taken at once.
- R Extract. Opil. ... gr. i.
Calomel ... gr. iv.
M. ft. pil. i. Two such pills to be taken at once.
- R Assafetida ... gr. ii.
Pulv. piperis ... gr. i.
Camphor ... gr. i.
Extract Opil. ... gr. i.
M. ft. pil. Two such pills in two or four hours.
- R Argent. Nitrat. gr. i.
Extract Opil. gr. ss.
M. ft. pill. to be taken every four hours.
- R Plumbi Acetat. gr. iv.
Extract Opil. ... gr. i.
M. ft. pil. To be taken every four hours.
- R Tinct Opil. ... m. xx.
Aq. puræ ... ℥i.
M. ft. haust. Statim. s.
- R Chlorodyne ... m. xx.
Aq. puræ ... ℥i.
M. ft. haust. Stat. s.
- R Pulv. Zingiber ... ℥ii.
To rub on the surface.
- R Mist. Cretæ ... ℥i.
Every two hours, or after every stool.
- R Plumbi Acetat. gr. v.
Acid. acetic dil. ... m. v.
Aque destillat. ... ℥i.
M. ft. haust to be taken every hour or two.
- R Acid sulphuric dil. m. x.
" Gallie ... gr. x.
Tinct Opil. ... m. x.
Aque puræ ... ℥i.
M. ft. haust to be taken every two hours.
- R Acid tannic ... gr. x.
Aque puræ ... ℥i.
M. ft. haust to be taken every hour.
- R spirit Ammon. Aromatic ... m. x.
Spirit Æther ... m. x.
Aq. Camphor ... ℥i.
M. ft. haust to be taken every quarter hour.
Liquor Ammon. m. x.
or Ammon. Carbon gr. v
May be substituted for Sp. Am. Aromatic.
- R Gin ... ℥iii.
Sugar ... ℥iii.
Spirit Æther nitros. ... ℥ss.
Lemon juice ... ℥iii.
Aq. puræ ... ℥viii.
M. ft. mist ℥i every two hours.
- R Liniment Terebenth. ... ℥i
To rub on the surface
- R Calomel. gr. xx. Stat. s.
- R Pulv. cretæ Arom. c Opio. ... ℥i
To be taken every four hours.
- R Pulv. Kin. c Opio. ℥i.
Ft. Pulv. to be taken every four hours.
- R Pulv. Ipec. ... ℥i.
Ft. Pulv. twice a day.
- R Pulv. Ipec. ... gr. v.
Sod. Carb. ... gr. v.
Pulv. Acac. ... gr. x.
M. ft. Pulv. every four hours.
- R Pulv. Ipec. c Opio. gr. ... x.
Ft. Pulv. every four hours.
- R Acid Hydrocyanic dil. ... m. iv.
Bismuth. Albi. gr. v.
Aq. Camphor ... ℥i.
M. ft. haust every four hours.
- R Plumbi Acetat. ... ℥i
Aque puræ ... ℥x
M. ft. enema to be used two or three times a day.

R. Alumin	... 3ss	Aqua destil.	... ʒxv	„ Acetate	gr. x.
Dec. Babul	... ʒxvi	M. ft. enema	to be used	Aqua puræ	.. ʒi
M. ft. enema	to be used	with a glass syringe	M. ft. haust	every four	hours.
two or three times a day.		once or twice.			

R. Argent. Nitrat. .. ʒi R. Potass Chlorat ... gr. v

Prophylaxis of Cholera. The prophylaxis of cholera is a topic of vast importance; and so it has been the cause of much enquiry and considerable discussion. The history of the disease has been traced as far back as it could possibly be carried, the etiology of it sought for in every conceivable element; and yet the prophylactic measures, hitherto suggested, are either purely hygienic or the revival of some obsolete barbarous institutions.

The hygienic measures recommended for cholera are precisely the same as for any other disease; *viz.*, good ventilation, good situation, high altitude, good dryness, good drainage, good conservancy, good personal cleanliness, good house, good food, good water, good air, good clothes, good sleep, good exercise; regular hours, regular habits, &c., &c., &c.

All this is easily understood, though not so easily secured.

Even grant desertion of home and marching into camps, and quarantine. Would all this prevent the spread of cholera? I think not. And the reason is very plain, because it is a catarrhal disease dependent on atmospheric changes. If it were due to contagion alone, why should it ever disappear from Calcutta? But even diseases undoubtedly contagious, such as small-pox and measles, are not kept out by quarantine. How much smaller must be the chance then of keeping out cholera by any such questionable expedient? The idea is absurd and would not bear the test of examination. .

My opinion is, that if good sanitary laws were enforced on board ship and among caravans, no quarantine would be required. If they were not observed, then to strip and bathe the wayfarers, and to put them into clean clothes, and either to boil or burn their own, would be amply sufficient in so doubtful a disease as cholera. To frighten it away by the firing of guns and similar means are puerilities which require no serious refutation.

Conclusion.

This brings the present paper to its conclusion ; but I cannot finally dismiss the subject without apologising for seemingly overlooking the labours of others. This is not due to any want of reading or respect. It has solely arisen from an anxiety to give only my own results, and a determination not to spin out by taking things at second hand, or entering into unprofitable discussion. I particularly regret that the plan of this paper precluded all possibility of referring to the valuable labours of Drs. E. A. Parkes, Gull, C. Morehead, J. W. Ogle, Edward Goodeve, Sir R. Martin, E. Mesnet, John Macpherson, Joseph Ewart, and other writers of eminence. Nevertheless I trust the facts I have brought forward in many cases will be found to support their conclusions, or to throw new light on various questions of importance.

MALARIOUS DISEASES,

Continued from No. 21.

ON MASKED MALARIOUS FEVER ;

AND THE SEQUELÆ OF MALARIOUS DISEASES.

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CHAPTER I.

ON MASKED MALARIOUS FEVER.

Correctness of the term—Primary febrile manifestations—Authors referring to masked fever—Causes of masked fever—Constitutions most liable—Symptoms—Duration of masked fever—Classes in which most common—Connection with other malarious conditions—Treatment.

THE condition I have ventured to designate Masked Malarious Fever is one which has not hitherto been fully recognized by writers on tropical disease. I have elsewhere¹ drawn attention to this peculiar malarial manifestation, and on a paper on the subject being read before the *Bombay Medical and Physical Society* in 1861, the correctness of applying the term fever to a condition in which the pulse

¹ *Bombay Medical and Physical Society's Transactions*, 1861, page 94; also the *Author's Manual of Diseases of India*, p. 81.

is not always accelerated, was called in question. It was contended that there could be no fever without some such excitement, and that the term was, therefore, improperly used.

Notwithstanding such objections, I am still of opinion that the term fever may with propriety be applied to that peculiar state of the system, I describe as Masked Malarious Fever. There must be degrees, of fever, as of all other maladies, and, instead of the phenomena occurring in the intense or manifest form, it may be latent, and not sufficiently powerful to excite those characteristic signs and symptoms, accompanying a more decided manifestation. In order to establish this position, it becomes necessary to enquire into the more recent discoveries and facts regarding the febrile state generally.

The researches of Dr. Parkes, of Dr. Jones of Augusta, and of Virchow and Wunderlich, have demonstrated that the febrile condition is associated with, in some cases more abundant, in other instances less abundant, excretæ from the body, than in health. The bodily temperature and the amount of excretions bear some relation to each other, but both these may be altered *without any sensible variation in the force or frequency of the pulse*. The first signs of a febrile condition must be some alteration in the amount of excretæ, particularly of urea, sulphuric and carbonic acids, although, indeed, we may not be able to detect such changes. Increased temperature (evidenced in masked malarious fever, by burning palms, and heat of the soles of the feet) is a *second* link in the chain, and one more generally recognizable. But alterations in the pulse, such at least as may be detected by the touch of the physician, belong to a third or more remote

chain of events. Probably the sphygmograph may detect variations of the pulse at an earlier period. But recollecting that, the inception of fever consists in alteration of the amount of excreta, it certainly must be admitted that such a condition may exist, without at the commencement passing on to such an extent as to affect the arterial pulse. The first of those changes, combining to produce the complex phenomena of fever, is the entrance into the blood of some morbid agent, and this may occur without at first any appreciable alteration of the general health. But when the changes in the blood produced by the poison, have reached a certain point, the nervous system and those organs, especially connected with nutrition, begin to suffer changes, which, so far as we know, alter or destroy normal molecular action. At this stage we have symptoms of debility, depression, and relaxation, followed by disintegration of certain constituents, and the production of preternatural heat. But all this may occur in a minor degree, and the pulse remain unaffected. The febrile state exists without the comparatively ultimate results of cerebral affections, as coma, delirium, or stupor, and there can be no doubt that it may be present in a still lesser intensity; not sufficient even to alter the characteristics of the pulse, as judged by the touch. Improved methods and instruments of research will, probably ere long, fully demonstrate the truth of these remarks. Wunderlich, who details striking instances of disease detected by the thermometric observation, states that when ague has apparently disappeared, an increase of temperature may be detected periodically, unaccompanied by any other symptom. So long as this periodic rise of temperature continues, the patient cannot be said to be cured. But the metamorphosis of tissue, or the change in the amount of the excreta is not sufficient to affect the pulse, which will only become excited

when the changes going forward in the system become more rapid.

Although no one, excepting myself, has described "Masked Malarious fever" under a distinct heading, several writers have, more or less, vaguely referred to the subject. Thus Watson¹ observes—"Sometimes there is no distinct stage at all, but the patient experiences frequent and irregular chills, is languid, uneasy, and depressed. This state is commonly known among the inhabitants of our fenny districts as the dumb or dead ague; the patient is said not to shake out." Mr. Day,² after stating malaria may be so violent as to kill at once, remarks that in less intensity it causes slighter degrees of malarious fever. Another writer describes two kinds of fever—one carrying off its victims quickly, the other not killing but gradually wasting the body. Moorhead⁴ mentions "slow malarious influences," as existing probably unnoticed or uncared for, until affections of the liver or the spleen are induced. Similarly, many of those disorders, designated Neurolytic,⁵ may be traced to a marked febrile condition, the consequence of malaria.

Masked malarious fever may, indeed, be regarded as the manifestation of the presence of the malarial poison, acting in a minor degree of concentration on a delicate and irritable constitution: or present in greater intensity in a more vigorous and powerful habit. It consists of the first degree of febrile excitement, and will occur the more readily in

1 Watson's *Practice of Physic*. Vol. I., p. 725.

2 Day on *Tropical Fever*. *Ind. Ann. Med. Sci.*

3 *Reminiscences of Lahore*. *Indian Lancet*, Sept. 1860.

4 Moorhead's *Clinical Researches*, 2nd Ed. p. 44.

5 Jones Handfield on *Neurolytic or Aguish Disorders*, 1859

persons who have acquired a scorbutic diathesis, and especially in delicate females weakened by prolonged lactation, leucorrhœa, or other affections of the sexual organs. Prolonged discharges, as from hæmorrhoids, will also produce that condition of system, favourable to the insidious and inceptive action of malaria. Any cause, indeed, reducing the system below "par" will aid in the induction of this malarious affection.

The individual under such influence complains chiefly of heat, dryness, and burning in the palms of the hands, and less frequently in the soles of the feet. These phenomena present themselves at intervals of months, weeks, or days, and may be persistent for such periods, or more or less intermittent or remittent. When the burning in the palms is intermittent, there are intervals when these parts become moist and cooler. There is often some general but ill-defined uneasiness, perhaps slight evanescent headache, or a tired feeling in the limbs, not amounting to actual pain. The appetite generally remains unaffected, and the symptoms, as above, are not unfrequently less felt after taking food or stimulants. Sleep is restless and disturbed by dreams. The alvine evacuations are normal, but the urine is generally charged with excess of urates. The circulation, as judged by the finger on the radial pulse, is not excited; weakness of calibre is however frequently perceived. Sometimes, in addition to the burning in the palms and soles of the feet, there is heat about the cheeks and eyes, and occasionally even injected conjunctiva. It is, however, questionable if this latter appearance is not more due to the rubbing the eyes with the fingers, which the burning and heat induces, rather than to the same cause as the burning itself. Singing in the ears, as of a kettle boiling or distant crickets chirping, is also

frequently present; and of course more particularly noticed during the silence of night. Persons affected with masked malarious fever, are generally disposed to chilliness and fear, and indeed require very large amount of clothing in the cold weather. In the hot season they are characterized by exceeding languor, and inability to bear the increase of temperature. I have also noticed frequent micturition, especially at night, (the sign of an irritable bladder), is often present. When this is the case, the probability of incipient albumonoid disease of the kidneys should be recollected. The condition here sketched, or some portion of the signs and symptoms enumerated may prevail for months or even years. When the abnormal manifestations are slight, and have become habitual, they scarcely attract the attention of the individual: but in other instances of a more confirmed nature, they constitute a perpetual source of annoyance and discomfort. Persons thus affected must be regarded as especially prone to attacks of fully developed fever. But in very many cases, it has appeared to me that they escape the latter by the malaria expending itself in the constant induction of the masked form. Masked malarious fever in its most recognizable type is, indeed, often observed in those primarily robust Europeans, who have been long in the tropics, but who have not suffered from severe or repeated attacks of either intermittent or remittent. By a comparison of the symptoms here given with those presently enumerated as characteristic of anæmia, leucocythæmia or chronic malarial poisoning, it will be observed that the conditions are essentially different. It is true that masked malarious fever may be and indeed frequently is the first link in the progress of deterioration, but the former named affections are something more than the latter. In masked malarious fever the *materies morbi* is still excreted from the

system in sufficient quantities to prevent decided blood deterioration; in the latter it accumulates in excess, and hence those secondary effects of various organs presently referred to.

It not unfrequently happens that masked malarious fever is accompanied and complicated by cutaneous affections. Of these, eczematous eruptions are the most frequent. The irritation thus produced materially adds to the general irritability present, and renders the febrile condition more masked.

The *treatment* proper to be pursued when masked malarious fever is present, consists in an essentially tonic and somewhat stimulating *régime*. It is seldom that dyspeptic symptoms are a prominent subject of complaint, but should this occur, too great attention cannot be given to procuring an easily digested, but essentially nourishing, diet. I have frequently observed that persons so affected consume a large quantity of meat; and within moderate bounds it is well to permit the inclination to be followed in such respect. A daily proportion of good sound ale I would also advise, in preference, as a general rule, to any variety of wine or spirits. Coffee, which has long enjoyed a questionable repute as an antiperiodic, has appeared to me to exert some beneficial influence. It has been strongly recommended for its febrifuge properties by Nebelius, Baglavi, Payen, Delieux, and others. The author last named states, moreover, that roasted coffee is far from possessing powers equal to those of the raw berry. He, therefore, in case of malarious poisoning, uses a decoction of the berry in its raw state, instead of the common infusion. As regards medicines, I have more confidence in the *Liquor Arsenitis Potassæ*, than in any other of the reputed febrifuges. Change of climate is, however, the only certain means of cure.

Simple change of *locality* will not suffice to overcome the malady. The removal must be into a northern European country. The Indian hill ranges do not afford a permanent relief. And in England the burning palms, and singing in the ears will frequently for months demonstrate that even the British climate will eradicate the taint, only after a prolonged residence. Probably few medical men would consider it necessary to recommend their patients a radical change of climate, when presenting merely the symptoms of masked malarious fever; and most patients also would object to taking this step on account of an ailment apparently so trivial. It cannot, however, be forgotten that this condition is the first link in a chain of events, which will ultimately render the removal imperative.

CHAPTER II.

THE SEQUELÆ OF MALARIOUS FEVERS.

Organs complicated—Blood primarily affected—Arguments for and against this—Functions of spleen Action of malaria on liver—Anæmia chronica—Distinguished from Leucocythæmia—Symptoms—Influence of temperament—Anæmia in the natives—All classes subject to it—Influence of sex—Of opium eating—Anæmia acuta.

The sequelæ of malarious fevers may be considered in accordance with the parts affected, as they have their seats in more important organs, or systems of organs. Thus:—

1st.—IN THE BLOOD.

2nd.—ORGANS OF DIGESTION, ASSIMILATION, AND EXCRETION.

3rd.—HEART AND ORGANS OF CIRCULATION.

4th.—BRAIN AND NERVOUS SYSTEM.

5th.—ORGANS OF RESPIRATION.

6th.—URINARY ORGANS.

7th.—ORGANS OF GENERATION AND ON CHILD-BIRTH.

8th.—SKIN AND INTEGUMENTARY SYSTEM.

9th.—JOINTS AND ORGANS OF LOCOMOTION.

10th.—ORGANS OF SPECIAL SENSE.

. But as in all malarious diseases the blood is primarily affected, so every organ or system of organs, is implicated secondarily through the medium of the circulating fluid. Malarious diseases are indeed essentially blood diseases. This is demonstrated, not only by the changes which take place in the blood when saturated with the poison, either primarily or through the implication of digestive organs, but also by more apparent and easily recognizable results. It is a well-known fact, that in localities where malaria is most constantly and abundantly present, the race of inhabitants degenerates. Their stature is small, their complexion sallow, and should no acute disease supervene, they become prematurely old and wrinkled. Even their children early acquire an aged aspect, and the spirits and intellects of those dwelling in these unhealthy spots are depressed and feeble, partaking of the degeneration of the physical powers. Of this we have instances in the inhabitants of many parts of America, of districts in Italy, of Lower Bengal, and other localities.

I am aware it has been argued that the blood deterioration of malaria is secondary and not primary: that it depends on disease established in the spleen or lymphatics. It has been asserted that portions of splenic pulp, changed and softened by inflammatory action; or otherwise atoms of extravasated blood, changed in their nature and unfitted for their legitimate purpose; find their way into the circulation, either through the splenic vein or lymphatics: and that the blood thus becomes deteriorated somewhat in the same manner as is supposed to occur in pyæmia. And the fact of spleen disease

sometimes being present without *apparent* blood degeneration, is also an argument favourable to this theory. A review of the functions of the spleen also supplies an explanation of the intimate connection existing between spleen disease and the more *advanced* stages of cachexia. It is undoubted that one of the functions of the spleen is to provide a receptacle or reservoir for blood during the progress of digestion, or at any time when the free passage of the circulating fluid through the portal veins is impeded. We have also every reason to believe that the organ affords important assistance in the process of digestion.¹ Thirdly, it also appears probable, that the spleen prepares, or accumulates hæmatine for the preparation of the red globules.² Lastly, it has been surmised that white blood corpuscles are formed from those nucleoli which exist in the spleen and lymphatic glands, and that according as any of these organs become enlarged or hypertrophied, so would the blood be changed with an excess of white cells.³

Thus it is not difficult to account for the excessive anæmia and other peculiar symptoms met with, when malarious blood degeneration and spleen disease are combined. But the results of the latter are distinct from the primary conditions of simple malarious blood-poisoning. The idea that enlarged spleen may exist without other malarious manifestations is erroneous. There will always be masked malarious fever, or

1 Schiff believes the spleen influences the formation of *peptogens*,^{*} and also has some influence on the pancreatic secretion. Archiv. für Heilkunde, No III. Quoted in Braithwaite's Retrospect, 1861.

2 Maggiorani Memori on Functions of the Spleen. Comptes Rendus, February 18th, 1861.

3 Virchow and Bennett mention the anæmic condition as dependent on either enlarged spleen or lymphatics. Dr. Wilks (*Lancet*, July 8th, 1863) also reports excess of white corpuscles, in connection with enlarged glands only.

some other primary, although perhaps, obscure initiative sign. Again, fever may occur many times over and for lengthened periods without the spleen becoming affected, which would not be the case had malaria a primary action on the organ. Another argument in favour of the idea that disease of the spleen is the consequence, and not the cause of malarious blood cachexy, is the fact that in some parts of the world, even in some Indian localities, the liver is more often affected than the spleen, as a result of malarious saturation. Hence the term "Bilious Fever," under which authors have described remittent with hepatic complication. In Zealand the biliary functions suffer so much during fever attacks, that the disease is commonly known among the inhabitants as "gall fever." Frerichs believes, the liver is affected as a result of malaria almost as often as the spleen. The occurrence of epidemic jaundice among the men returned from Afghanistan in 1849, and from the Persian campaign in 1857, afford striking examples of malarious influences affecting the liver rather than spleen. No one, however, supposes that malaria acts upon the liver primarily, and through that organ on the blood. Enlargement or other changes in all internal organs, whether spleen, liver, or lymphatics, are, I believe, secondary effects, the result of febrile action, either patent or in the masked and obscure form previously described. Then the influences of organic disease, either functional or permanent, come into play with ten-fold aggravation of the anæmic condition.

The primary action of malaria, or as a sequelæ of fevers may now be considered—

1st—IN THE BLOOD.

A.—*Anæmia Chronica.*

B.—*Anæmia Acuta.*

A.—Anæmia, although originating under the influences above detailed, and without the occurrence of prior decided paroxysmal fevers, is also the most frequent sequel of active malarious disease. Sir Ranald Martin¹ mentions it as the most general of all conditions incidental to tropical invalids. It has been described by Vogel² under the term of “Malaria Chlorosis”; by Woodward³ as chronic malarial poisoning; and by Mapleton⁴ under the expressive although scarcely scientific term “used up.” Anæmia must be distinguished from further degeneration arising from malarious influences, as leucocythæmia, or its subdivisions *splenæmia* and *lymphæmia* afterwards referred to. The latter cannot exist without some morbid state of spleen or lymphatic glands, either functional or organic.

But simple anæmia may be present while these organs are in a normal condition. Malarious anæmia, also, must not be confounded with the cachexia consequent on albuminuria, when the latter occurs as a consequence or sequel of malarious affections. The latter malady supervening on the former, renders the case next to hopeless, and the condition of urine will of course very much determine the prognosis. Anæmia may be defined as a special morbid state, in which the mass of blood is lessened in volume, and the *liquor sanguinis* contains an excess of salts and less of albumen. These conditions exist with a deficiency of red globules. It is very possible that some change or defect may have already occurred in that part of the system, whether spleen or elsewhere, in which the red cells are elaborated. But this cannot yet be distinguished by any method with which we are acquainted.

1 Martin on *Tropical Climates*, p. 98.

2 Vogel. *Year Book*. 1861.

3 Woodward on *Diseases of United States Army*.

4 Mapleton. *Blue Book*, p. 253.

Moreover, deficiency of red globules, characterizing all descriptions of anæmia, such as chlorosis and albuminuria, we are not justified in attributing diminution of red particles to spleen affection. In the condition presently described as leucocythæmia, there is also, in addition to other changes, a deficiency of red globules. But this also implies what anæmia does not, *viz.*, the presence of an undue quantity of white cells in the blood. A diminution of pigment in the urine is, however, generally noticeable. Malarious anæmia may, indeed, be regarded as the first link in the series of changes resulting in leucocythæmia. Simple anæmia from malaria does not, in the first instance, differ from a similar condition—the consequence of other debilitating diseases—except as regards certain concomitants of the latter. Thus for instance, anæmia dependent on Bright's disease is associated with albuminous urine: if it depend on tuberculosis or suppuration, there will probably be hectic fever: if from loss of blood, there may be uterine malady, or hæmorrhoids. And it is well to bear these associations in mind, otherwise anæmic states, occurring after attacks of fever, but chiefly depending on the presence of other maladies, may be confused.

The results of this morbid condition of the circulating fluid known as anæmia, are the occurrence of certain well-known symptoms, having immediate reference to the vascular system and nutrition.

Debility is the prominent complaint, but the appearance of the sufferer is alone almost sufficient to establish a diagnosis. The skin is pale and wax-like. The conjunctivæ have a pearly tint, and the gums are less rosy than natural. There is a dull depressed expression of countenance, and the movements are languid. This want of colour of surface is readily distinguishable from the sallowness caused by bile,

especially in the lower half of the conjunctivæ which are not yellow. The urine also does not contain bile, with which it is frequently charged when the liver is affected. The tongue is pale, flabby, and large; the appetite capricious; and thirst frequently felt. At rest neither pulse nor respiration reach the normal standard, but the least exertion excites both. Mental emotions also have a similar effect. As a rule, debility is more felt in the early morning than at other periods of the day. In the earlier stages of the malady, the feeling of lassitude passes off after taking breakfast; and this is especially marked in the malarious anæmia of India. Frequently the pulse is intermittent, and sometimes only so before breakfast. At an early period of the malady, there is sometimes a sensation of uneasiness, not amounting to actual pain, in the cardiac region, and a thrill may often be felt. The patient will also probably complain of the heart beating forcibly, and giving rise to unpleasant sensations when lying on the left side. As the degeneration advances, characteristic murmurs, cardiac, venous, or arterial, may arise. The former generally consist of systolic murmurs, heard as Walshe points out, rather towards the base than the apex of the heart. Venous murmurs may be heard in the jugulars or almost any large vein; also it has been stated in the course of the superior longitudinal sinus. Vogel mentions having heard murmurs during intermittent fevers, and in malarious cachexia in the brachials, subclavians, femorals, and carotid arteries. When the anæmia has persisted for sometime, œdema of the feet frequently occurs.

The class of persons most subject to fall into this condition are amongst Europeans—those more nearly approaching the lymphatic and nervous temperaments. The sanguine temperament appears better able to withstand the influences of malaria.

Age does not seem to exert any appreciable influence. Children, old people, and adults, are equally liable to this malarious cachexia. Infants at the breast are less generally affected, but even at this tender age, the occasional occurrence of enlarged spleen demonstrates that exemption from malarious influences is not afforded by childhood. Cases, indeed, are on record of this organ being found enlarged at birth, and of intermittent paroxysmal fever attacking the *fœtus in utero*. Simple malarious anæmia, unaccompanied by any organic change, is however very liable to be overlooked in an infant. The primary marked febrile manifestations are unnoticed, and the enlargement of organs, or very marked cachexia is first perceived. Many classes of the natives also are almost as subject to malarious anæmia as Europeans. It is true there are some varieties of the former, who are said to live unscathed in the most malarious districts. Thus the Garrow tribe on the frontiers of Assam, who inhabit a country into which no European can penetrate without imminent danger, are stated to be a powerful race.¹ Slaves again of the Southern States of America are reported to have found safe asylums in deadly jungles, where their masters could not follow them without risk of life. The inhabitants of the coast of Africa are also generally supposed to be thus malaria proof. I doubt, however, the correctness of these and similar assertions. If the Garrows on the frontiers of Assam remain an extraordinarily robust race in the midst of a hilly and malarious country, they are decidedly different from any race of hill-men I have met with within the bounds of the Himalayahs. Far without the tropics, in regions where malaria is less abundant, as in the higher lands of Central Asia, or even in Afghanistan, the mountaineers are a robust race, but not so

1. McCook's *Advice to Officers in India*.

in tropical or semi-tropical Indian limits.' Again, the former slaves of America were not proof against the malarious influences of the climate of the Southern States. Especially since the emancipation we are credibly informed that the slaves die in a larger proportion than white inhabitants. Similarly, those who have served on the African coast state, the natives are by no means exempt from the degenerations arising from paludal emanations.¹ And as regards the people of this country, it is indeed a well-known fact that the inhabitants of one locality frequently become diseased when removed to other districts. This condition described as "Cachexia Loci" is partly the result of malaria, partly arising from other causes, which may be defined under the term Nostalgia. But the mental depression accompanying this affection, is the predisposing cause of that anæmia, so quickly induced when malarious influences are super-added.

As regards sex, I believe, *cæteris paribus*, the female is more liable to malarious anæmia. As generally possessing the least powerful and more susceptible constitution, and as being exposed to certain debilitating agents, as child bearing and uterine maladies, theory would lead to the conclusion proved by experience. Amongst Europeans, the greater number of the male sex in this country, would, *primâ facie*, cause it to appear that men suffer more than women from this cause of disease. But if the females belonging to almost any European corps are examined, it will, I think, be found that a proportionately larger number of the women are subjects of more or less malarious cachexia than of the men. And with the natives this is very marked. The attenuated, withered, haggard appearances of so many comparatively young women,

1. Moriarty on Diseases of the Gold Coast. *Med. Times*, December, 1866.

may be traced to paludal influences, undermining the health at the first, and rendering the system prone to the accession of numerous other diseases. In many cases, however, the degeneration is originated from other ailments, malaria acting as the secondary degenerating cause.

As with the susceptibility of the native to paroxysms of actual fever, I do not think the liability to malarious anæmia is increased by the effects of opium.

B.—*Anæmia Acutus*—is not so commonly observed in India as it is said to be in Algeria, and some other malarious countries. Vogel especially mentions this degeneration as one of the frequent effects of malarin. All the conditions previously described, as the results of malaria or as following malarious fevers, take place suddenly. Instead of the deteriorations being gradual and the changes of weeks or months, they are the work of days. Persons tainted with scrofula, scurvy, or syphilis, are more liable to this rapid malarious degeneration, than others free from such additional blood poisons. In such cases, the simple anæmic condition rarely occurs without rapidly progressing into one or other of the more aggravated forms of malarious disease now to be described.

Both *anæmia chronica* and *anæmia acuta* (the latter more rarely) may be present without recognizable concomitant organic additions, or depositions, or radical changes in any organ, excepting the evident diminution of the number of red blood globules. But the conditions next described are associated with changes generally organic, in one or other of the parts concerned in the offices of digestion and assimilation. And although other changes still progress in the blood, they appear rather secondary effects resulting from errors of organs, than due to the direct poisoning of malaria.

CHAPTER III.

SEQUELÆ IN THE ORGANS OF DIGESTION, ASSIMILATION, AND EXCRETION.

A.—Leucocythæmia—Splensæmia—Lymphæmia—Symptoms. **B.**—Affections of the spleen—Temporary congestion—Symptoms—Permanent enlargement—Symptoms—Connection with diseased heart Splenitis—Softening—Induration—Abscess—Difficulty of diagnosing these conditions—Rupture—Symptoms. **C.**—Affections of the liver—Hyperæmia—Influence of malaria Symptoms—Susceptibility to Abscess—Post mortem appearances—Jaundice—Suppression of function—Existence of bile in the blood questioned—Symptoms. **D.**—Dyspepsia—Causes and results of—Symptoms divisible into three classes. **E.**—Affections of the stomach—Chronic congestion—Peculiar symptoms. **F.**—Affections of bowels—Diarrhœa—Diarrhœa alba—Dysentery—Morbid accumulations in the large bowels—Melæna—Hæmorrhoids. **G.**—Ascites.

2.—The sequelæ as noticed in the organs of digestion, assimilation, and excretion, are—

A.—Leucocythæmia: Leukæmia: White cell blood: including Splensæmia and Lymphæmia.

B.—Affections of the spleen, including simple temporary enlargement—Permanent enlargement—Splenitis—Rupture.

C.—Affections of the liver, including Hyperæmia—Jaundice—Suppression of function—Næuralgia.

D.—Dyspepsia.

E.—Affections of the stomach, including chronic congestion—Gastric hæmorrhage.

F.—Affections of the bowels, including Diarrhœa—Diarrhœa alba—Dysentery.—Morbid accumulation in the large bowels—Melæna—Hæmorrhoids.

G.—Affections of the peritoneum—Ascites.

A.—*Leucocythæmia*; *Leukæmia*; or *White cell blood*, that condition in which the number of white corpuscles in the blood is greatly increased with, or very rarely without a diminution of the red, is now known not to depend on spleen disease alone: or at least not to occur only when that organ is manifestly affected. Most chronic exhausting diseases, and some few acute affections, as typhus, pneumonia, and puerperal fever, have been accompanied or followed by this condition of blood. It is, however, more commonly met with in combination with recognizable splenic or lymphatic disease. Vogel states that in nineteen cases of white cell blood, splenic enlargement was present in sixteen. Both Bennett and Virchow also assert this connection; the latter, however, dividing the disease into the varieties *splenæmia* when the white globules predominate, which are peculiar to the elements of the spleen; and *Lymphæmia* when the elements of the lymphatic glands prevail in the blood: the latter characterized by innumerable round granulated nuclei, generally provided with nucleoli; the former by the white globules peculiar to the spleen. It has, indeed, been supposed that the glands named as generally connected with this disease become disintegrated, more or less of their elementary texture finding its way into the circulation. Virchow considers acute inflammatory processes lay the foundation of this morbid state. But anything materially interfering with the normal condition of the glandular organs, would seem capable of promoting disintegration. The congestions which the spleen undergoes during malarious fevers, appear likely, above all other conditions, to originate disintegration of texture; probably all glandular organs may be so affected, and it is not improbable that all at times contribute their part to the charging of the blood with morbid products. But however this may be, it is the spleen which is generally affected by malarious

fevers, and, therefore, it is with this organ that the present subject is more intimately connected.

The presence of an increase of colourless cells or particles in the blood may be demonstrated by microscopic examination. With a power of 250 diameters or upwards, colourless corpuscles may be seen to form from a fourth to one-half the number of the red. Also leucocythæmic blood in a test tube, especially if deprived of fibrine, will present a white appearance of the upper layer of the mass. Not being dissolved by æther, the suspicion of fat globules is negatived. The symptoms of splenic leucocythæmia are, in addition to the greater pallor consequent on the numerous white cells, a more aggravated condition of anæmia. The peculiar pallor is more marked, the debility more profound, and cardiac and venous murmurs more readily recognized. The tendency to passive hæmorrhages is more marked, and œdema of the extremities more frequently present.

B.—Affections of the spleen—Simple temporary enlargement from congestion.—Whenever the abdominal circulation is embarrassed and the abdominal veins gorged, as they must be during the cold stage of fever, the spleen in particular becomes distended with blood, and the distension not subsiding at once, the spleen becomes enlarged, although still susceptible of return to its natural bulk on the blood being again removed into the general circulation. This condition of spleen is noticed to occur in individuals convalescing from serious attacks of remittent or intermittent, with return of actual fever. Temporary congestion of this organ has indeed appeared to take the place of a renewal of the fever paroxysm, or to be the chief symptom of a very imperfect or masked type of the disease. In such cases, without recognizable permanent

enlargement, there will be periodical feelings of fulness and distension, aggravated by deep pressure over or under the organ, or sometimes accompanied by evident enlargement.

Permanent enlargement, which results from a repetition of temporary congestion, may be caused by the coagulation of blood, and its conversion into organized tissue, or by the passage of albuminous or fibrinous constituents into the spleen tissue between the cells, where it passes through a similar process. When this has occurred, the organ can only recover by the slow process of absorption and elimination, but during the earlier progress of cases of enlarged spleen, occurring during or after fever, the condition of the organ is one of engorgement, distension, and congestion, rather than that of fibrous deposit and hypertrophy of structure. That this is the case appears clearly evident by the very rapid manner in which enlarged spleen disappears (often in the course of a few days,) when the increase of bulk is due to congestion of blood, and has not passed on to the stage of deposition of albuminous constituents, and their conversion into organized tissue.

The latter condition of spleen may arise without the immediate exciting causes of paroxysms of remittent or intermittent. It may appear in connection with one or other of the forms of masked malarious fever: or it may occur without this condition even having been noticed. Nothing is more common in malarious districts, than finding people who have never suffered from fever affected with large spleens. Dr. Dempste proposed an examination of the spleen as an *experimentum crucis* of the sanitary condition of a district. The lower animals are also frequently affected in a similar manner, where spleen disease prevails among the human race.

In addition to the physical signs of enlarged spleen, there are the symptoms of anæmia and leucocythæmia. The tongue is pale, tremulous, and coated, the lips blanched, and venous murmurs may be recognized. There is also great tendency to passive hæmorrhages, and often purpura is seen on the lower extremities, the legs and feet become cedematous, and, as will afterwards be noted, ascites or general anasarca may result. Diarrhœa is also a frequent accompaniment. When the spleen is not greatly enlarged, abnormal præcordial dulness has been noticed, due to shrinking of the margin of the lungs, consequent on incomplete expansion, the result of limited respiratory action, attending excessive debility. Some authors have noticed endocarditis as a concomitant of the more active forms of spleen disease. Martin ¹ believes, the numerous sudden deaths of Europeans and natives of the army in Arracan, in the first Burmese war during apparent convalescence from spleen, arose from heart affections. "Vegetations on the aorta and valves, coagula and other appearances demonstrative alike of endocarditis, and of a diseased condition of blood being observable after death." But with the light of more modern pathology, it may be questioned if these so-called vegetations were other than fibrinous deposits, and if the sudden deaths alluded to were not due to embolism? I do not believe organic disease of the heart occurs as a symptom or consequence of spleen disease, although the organ is always functionally affected.

In some cases of spleen disease, the organ has been found so enlarged as to weigh from ten to thirty pounds, even exceeding the liver in volume. Occasionally we see spleens of immense size occupying two-thirds of the abdominal

¹ Martin on *Influence of Tropical Climates*, p. 287.

cavity, and causing apparently little disturbance of health. The toleration, however, is not lasting, and sooner or later the cachectic state described above supervenes. Children equally with adults are subject to this affection. It should also be noted that after attacks of fever, or without these exciting causes, spleen disease may commence as acute *splenitis*, and the train of symptoms just noted follow. Inflammation of the spleen, however, occurs more frequently during attacks of malarious fever than as a sequel. Although inflammatory action has been considered rare in the spleen, the pain and turgescence so frequently found not departing during the intermission, cannot be attributed to any other process than what I prefer designating inflammation. That the organ is susceptible of such action, we are aware, from the occasional results of blows or violence. Moreover, *post mortem* examinations following injuries have disclosed the spleen of a deep red colour, and with the tissue so softened as to be readily broken down; just that condition which might be expected as the result of inflammatory action.

When the spleen is thus enlarged, the appearances on a section of the organ are very variable. The colour, as before remarked, is generally deepened, sometimes almost black, the whole section having a granulated appearance. It is also friable, and torn with ease. Frequently it assumes grumous pultaceous appearances to which the term *softening* has been applied. In other instances, it has been found small, tough, vascular, and partly cartilaginous, with spiculæ of ossification in various parts. It is then said to be *indurated*. Occasionally it has been covered by patches of coagulable lymph, while collections of the same material or even pus has been found in its structure. I am not aware of any certain method of diagnosing these particular changes during life.

Rupture of the spleen.—When this organ is enlarged from malarious cachexia, it is generally, as already stated, extremely tender and friable, and may be readily ruptured by a blow or even bodily exertion. There is moreover thickening of the investment, and probably adhesions to neighbouring organs, materially lessening the mobility of the gland. All these conditions are favourable to rupture of the organ without the application of extraordinary violence. Dr. Heddle,¹ who collected a number of cases of ruptured spleen, remarks that they all occurred in persons who had suffered from malarious fever, or resided in malarious localities. Moreover, it has been found that the majority of instances of ruptured spleen have been noticed during those seasons when the organ is subjected to additional malarious influences. In this condition of the spleen, we have our explanation of the occasional sudden death of natives, after the receipt of a trivial blow or injury. Blows on the abdomen may indeed rupture the organ, or even the liver, and yet leave no trace on the cutaneous surface.

This, however, is not so extraordinary, when as Dr. Chevers² observes, we recollect Morgagni's case of a monk, whose skull was fractured by a blow which failed to rend even his silken cap. It was mentioned above that the spleen, when enlarged, is sometimes ruptured by physical exertion, and of this I have met with an instance. A man having a large spleen, after riding a camel a long distance, suddenly became, collapsed, and was brought in dead. The organ was found lacerated. Cases of spontaneous rupture have also been recorded, occurring during the distress and distension of the cold stage of fever.³ Rupture of the organ is not, however,

¹ Heddle. *Bombay Med. and Phy. Soc. Trans.* Vol. I. p. 304.

² Chevers' *Medical Jurisprudence*, p. 144.

³ Webb's *Pathologia Indica*, p. 144.

immediately or even necessarily fatal. A person has been known to live three days after rupture,¹ and other instances have occurred, in which laceration of the spleen was diagnosed, but the patient recovered. Also *post mortems* sometimes disclose cicatrices on the covering, and in the substance of the organ, which could scarcely originate from any other cause than laceration.

The symptoms of spleen rupture are local and constitutional, the former consisting of pain more or less intense probably followed, unless death occurs, by peritoneal tenderness and inflammatory action. The constitutional signs are depression, and more or less collapse, with its failing pulse and distinctive countenance.

C.—*Affections of the Liver*—*Hepatic congestion or Hyperæmia*.—In addition to the well-known excitant action of heat on this organ, and of the congestion taking place during paroxysms of fever, there is reason for supposing that the liver is also affected specially as one of the results of malarious poisoning. In India the prevalence of hepatic disease is more marked in localities noted as malarious, and especially in the neighbourhood of damp marshy ground, than in other places where the actual range of temperature is higher. Again, hepatic affections usually attain their greatest frequency in the autumnal seasons, when a declining temperature and a greater evolution of malaria are concomitant.

Malaria may, therefore, be regarded as one predisposing cause of congestion of the liver, acting probably on that organ through the impaired condition of the blood. A person after recovery from one or other form of malarious fever, does not

¹ Beatson on *Chittagong Fever*. *Ind. Annals*. No. XIII., p. 18.

regain perfect health, but complains probably of headache, nausea, or occasional vomiting of green bilious matter. The bowels are irregular, sometimes constipated, at others the reverse, and the evacuations vary in colour. There is also great depression of spirits and debility, with a sense of tension in the right hypochondrium, and if the spleen is implicated, over that organ also. At other times, a sense of *weight* in the regions named is more remarked, while lumbar pains and uneasiness in the right shoulder or down the arm are general accompaniments. The countenance is sometimes sallow from the commencement, but more often it assumes this appearance as the malady advances. The tongue is variable; sometimes coated, sometimes clean. There is seldom any increased frequency of pulse, or elevation of temperature.

If this condition is not checked, the liver gradually enlarges, and the gastric and intestinal derangements become more marked. The countenance grows more sallow, or actual jaundice supervenes, while emaciation increases. Dropsical effusions may also occur in the abdomen and cellular tissue of the feet and hands, afterwards spreading over the whole surface. Dysentery, diarrhoea, or symptoms of suppuration in the liver are among the signs heralding a fatal termination.

The symptoms of the latter stages, as well as the *post mortem* appearances, are necessarily different, according as one or other of the maladies noted supervenes. Dysentery and diarrhoea will of course manifest their presence by unmistakable signs, and their occurrence adds immensely to the dangerous import of the diseased condition. But the occurrence of suppuration in the liver is not so easily diagnosed. In this form of insidious, asthenic, hepatic abscess, the fever, rigors, and irritability frequently denoting the

formation of other varieties, are either absent, or so faintly marked as to pass unnoticed. The records of medicine furnish numerous instances of abscess of this organ unsuspected during the life of the patient; and it is when the system, and especially the liver, is affected by malarial poisoning, that this insidious hepatic abscess is most likely to exist. The presumed connection between dysentery and abscess of the liver, will of course lead to suspicion of the latter on the occurrence of the former, but in the early stages of hepatic suppuration, unaccompanied by the characteristic symptoms, we have no certain method of diagnosis. The thermometer, however, may eventually be of service in such cases. It is scarcely possible that any considerable suppuration in the liver would take place without some alteration of temperature, which, although not recognizable by the touch, would be demonstrable by the thermometer. I have not yet had an opportunity of putting this to practical proof, but as suppurations in other parts have been foretold by the use of this instrument, there appears no reason why the liver abscess should form an exception.

The changes found after death from *malarious hyperæmia* of the liver and its complications are various. The organ generally found softened and enlarged; much of the increase of size being apparently caused by the presence of dark fluid blood. There are also patches of sub-peritoneal effusions, evidently the product of an inflammatory process. Occasionally, especially when the spleen has also been diseased, deposits of dark coloured blood pigment have been detected, sometimes uniformly distributed round the circumferences of a mass of lobules, at others limited to the upper part of those organs. 1

1 Frerichs. *Diseases of the Liver*. Vol. I., p. 318.

If abscess exist, there may be one or many. Sometimes the whole liver is as it were studded with small collections of pus about the size of a pea. In this form of asthenic or malarious abscess, the pus is seldom bounded by a cyst, or even by any distinct exudation, or zone of congestion. In other portions of the liver, softened spots may be found, in which disintegration of hepatic cells has apparently taken place, producing the appearance of a granular mass which, under the microscope, is seen to contain numerous oil globules. In some instances, but more often in temperate climates than in the tropics, the liver has been found more or less pale or fatty, or indurated or cirrhotic. In these conditions the deposits of pigment, mentioned above, are detected with less difficulty. When diarrhoea or dysentery has prevailed, the characteristic *post mortem* appearances of those affections will be also apparent.

Jaundice.—The remarks under this head in the article on Remittent,¹ are equally applicable to jaundice occurring as a sequela of malarious fever, or as an accompaniment of malarious cachexia. Although yellow discoloration of the skin may occur without recognizable hepatic affection, the majority of instances of jaundice afford other evidences of the liver being implicated. But there is another condition of the liver, frequently occurring as a sequel of malarious fever, differing from either of the foregoing. This is *suppression of function*, which may happen either in combination with more or less enlargement, or atrophy, or other change, or as very commonly occurs, may persist independently of such diseased states. When suppression of function is combined with enlargement or alteration of structure, some degree of jaundice

¹ *Indian Annals*. No. 20.

will probably exist. But when suppression of function occurs alone—without enlargement or change of structure—jaundice or yellow discoloration of the skin is not a consequence. I am aware that the question as to whether there could be a suppression of the secretion, has been sometimes affirmed and sometimes denied, according as the liver was regarded as the seat of secretion, or as merely a filtering agent. But I believe the arguments are strongly in favour of the former view. Numerous instances of jaundice, it is true, occur where we cannot point to any obstruction in the excretion of bile, even although we fall back upon assumed catarrhal constriction of the ducts, or supposed spasmodic contractions or paralysis. But no one supposes the urine, as a whole, or the pancreatic juice, or the saliva, or the tears, or any other secretion exists ready-manufactured in the blood, and analogous reasoning would not lead to the belief that bile was an exception to the general law. Andral,¹ Watson,² and Budd³ have maintained that bile does not originate in the liver, but is previously generated in the blood, and the opinion of such authorities is certainly entitled to respect. But on the other hand, repeated chemical analyses of the blood have failed in detecting the admixture of bile. Neither the colouring matter, nor the acids of the bile, substances for which there are certain tests, have been found. Unlike one of the constituents of urine, which accumulates in the blood consequent on granular renal disease, no portion of bile or bile acids accumulate when the liver is affected in a similar manner. Cases of fatty degeneration of the latter organ occur; in which, although secretion cannot take place, there are no symptoms

1 Andral. *Quoted by Frerichs on Disease of Liver*, p. 78.

2 Watson. *Practice of Physic*. Vol. II., p. 308.

3 Budd. *Diseases of the Liver*, p. 374.

of jaundice.¹ Moleschott and other experimentalists have taken the liver from frogs, and a few days afterwards failed to find a trace of bile in the blood. In obliteration of the portal vein, jaundice is also said to be pretty frequently absent.² Lastly, in the *diarrhœa alba*,³ or white diarrhœa of India, and especially of hill stations, bile, or certainly the colouring matter of bile, is absent from the alvine evacuations for weeks or months. And although it does not escape by the urine, there is no manifestation of its presence in the blood by the occurrence of jaundice.

The question whether the red portion of the blood, is or is not, the peculiar material of bile bears upon this subject. It has been theorized that under morbid conditions substances analogous to bile are formed in the blood from conversion of hæmatine, thus causing the yellow discoloration of icterus. But however this may be in so-called putrid diseases, jaundice certainly does not result from any such change in the peculiar condition, (*viz.*, suppression of hepatic secretion) now under consideration. And the same remark is equally applicable to the white diarrhœa or *diarrhœa alba* formerly mentioned. In both these maladies the formation of bile judging from its absence in the evacuations, is stopped. Yet no accumulation of bile takes place in the blood, no conversion of hæmatine yellows the skin, which assumes a pallid, white, unhealthy appearance, more resembling the characteristics of albuminuria than jaundice.

An individual suffering under complete atony of the liver, after malarious fever, will probably complain of debility irri-

¹ Haspel. *Maladies de l'Algérie*. Tom., p. 22.

² Frerichs on *Diseases of the Liver*. Vol. p. 184.

³ For description of this disease, see Grant. *Ind. An. Med. Sci.* No. 2; also the Author's *Manual of the Diseases of India*.

tability, very restless nights, loss of appetite, great depression of spirits, habitually cold feet, and disinclination to the slightest exertion. The countenance is pale, anæmic, and unhealthy-looking, yet not assuming the sallowness of partial or confirmed jaundice, even the lower parts of the conjunctivæ are rather pearly than sallow, thus affording no evidence of the presence of the colouring material of bile. The patient will always be found to have lost flesh. On enquiring into the condition of the excretions, it will be found that the urine is apparently natural, but that the alvine evacuations are white. As a general rule at this stage, the latter are formed; becoming loose as diarrhoea sets in at a later period of the disease. In less typical cases, where the liver is not totally inactive, the motions sometimes present a variegated appearance, portions of the mass being darkened by bile, and the part immediately adjoining quite white. More seldom the whole mass may be slightly coloured. In a typical case however, there is no coloration, and white stools are passed for weeks or months. At the same time there is no hypochondriac pain or other evidence of the liver being implicated. There is frequently no febrile action, although in some instances heat may occasionally occur, without any perceptible prior cold stage. The pulse is, as a general rule, weak, but not quickened, and the tongue clean and healthy-looking. After a longer or shorter period, particularly if change of climate has been adopted, the liver resumes its action, and gradual amelioration takes place. In other instances confirmed *diarrhoea alba* supervenes, and when this occurs, the gravity of the case is much increased. The termination of such conditions is gradual wasting and atrophy, only to be checked by early and thorough change of climatic circumstances.

Neuralgia of the liver is a very frequent sequel of malarious cachexia. The symptoms are slight uneasiness or sense of weight in the right hypochondrium often so trivial as to be forgotten, when the mind is occupied sometimes sharp twitches of pain resembling pleuritic "stitches" are felt. There is also uneasiness in the shoulder which feels *tired*. Lying on the right side will often relieve these feelings. Cold generally increases the uneasiness. The mind of the individual affected, often dwells on these symptoms, and he is in constant dread of some serious malady supervening. The hypochondrium is not tender, and there is no jaundice. Sometimes the neuralgic pains are decidedly periodic, occurring at certain times every, or every second day. Less frequently they have appeared to present instead a recurrence of supra orbital neuralgia.

D.—*Dyspepsia*.—One or other variety of dyspepsia may occur at a very early period of malarious cachexia. The latter then becomes more confirmed, the leucocythæmic condition presents, and the debility is aggravated by the splenic and hepatic affections previously named, and by the stomachic and intestinal changes presently mentioned. The occurrence of dyspepsia, as an effect of malarious blood degeneration, forms a weighty argument against the growing opinion, that dyspepsia is always the *primary* cause of those series of events terminating in chronic and mortal diseases, such as tubercle, cancer, insanity, and many forms of nervous and inflammatory maladies.¹ But however it may be with regard to the affections named, "whether the absence or alteration of absorbable elementary products," causes most of the diseases afflicting the human race, or otherwise: it is certain

¹ *Traité de la Dyspepsia*. Dr. Beau. 1866.

that dyspepsia will not *per se* induce either paroxysmal fever or malarious cachexia. But *pari passu* with the impoverishment of the blood, defective nutrition, the result of dyspepsia will further and immediately aggravate the case, by adding to the existing deterioration. When digestive, or we should rather say, the assimilative powers begin to fail, three different classes of symptoms may be expected. The *first* and more easily recognized series consists of those referable to the stomach and digestive canal itself, such as nausea, flatulence, heartburn, oppression, and fulness after eating, foul tongue, bitter taste in the mouth, &c. The *second* class are those we may designate reflex: such as dyspnoea referred to the epigastrium or sternum; a feeling similar to the globus hystericus; cough; pleurodynia; headache; cardiac pains; palpitations; and not unfrequently affections of vision as *muscæ*, and flashes of light before the eyes. The *third* series of symptoms, are those caused by the alterations in the constituents of the blood, which the defective or altered assimilation occasions. Thus, there is a further diminution of globular and albuminous elements resulting in debility, predisposition to congestions, and the excitation of any latent germs of disease, as scurvy, scrofula, syphilis. A consideration of the manner in which defective digestion and assimilation influences the system, will at once demonstrate the additional powerful deteriorating influences superadded, when dyspepsia supervenes on malarious anæmia, or on either of the sequence of changes, which result as the consequences of the malaria poison. Hence the exceeding virulence of malarious disease when it occurs in persons of dyspeptic habit. The ground is as it were ready prepared for the specific degeneration. When dyspepsia exists alone, it is some time, probably years, before the third series of results, the deterioration of the blood, follows the symptoms referable to the

intestinal organs themselves, and to reflex action. Errors of digestion, will not, until confirmed and extensive, alter the constitution of the blood. But in malarious cachexia this is already commenced previous to the origin of, and is indeed the cause of the dyspepsy.

E.—*Affections of the stomach including chronic congestion: gastric Hæmorrhage.* A Chronic congested state of the mucous membrane of the stomach and also of the duodenum is, I believe, a very frequent condition both during and after attacks of malarious fever. It may occur by itself, or, as perhaps more frequently happens, is associated with some form of splenic or hepatic affection. As the symptoms are more or less those of dyspepsia, as named belonging to the first class, the fact of actual chronic congestion being present is frequently overlooked, and the complaints referred to indigestion. Congestion is, however, generally accompanied by sufficiently marked indications. There is epigastric pain increased by pressure, and by taking food, with probably nausea and sickness. There may be also dry cough, and sometimes pyrosis. Oftentimes a similar combination of symptoms appears rather to depend on a neuralgic condition of the mucous membrane, than on the actual congestion which may have gradually subsided. Where these symptoms prevail long, and especially in elderly people, or if gastric hæmorrhage supervenes, the probability of *ulcer* is suggested. Ejection of blood as a sequel of malarious fevers, more frequently however depends on other causes.

Hæmatemesis or Gastric Hæmorrhage, depending upon detention of blood in the portal veins, from some mechanical obstacle to the onward passage, is very frequently connected with disease of both liver and spleen. The peculiar distribu-

tion and functions of the vessels, returning venous blood from the abdomen to the heart, will at once afford an explanation of the connection between venous hæmorrhage from the stomach and changes in the organs named. When loss of blood in this direction is symptomatic of hepatic affection, it is generally dependent on some morbid condition, implicating the ramifications of the portal vein, and more frequently accompanies an atrophied state of the liver. But hepatic affections, characterized by lessening of bulk of the organ, are not so common in this country as in colder climates. When, therefore, hæmatemesis occurs in India, it will most probably depend on splenic enlargement, which may be either simple distension of the organ, or change of, or addition to, structure. The writings of various medical authors mention cases in which the spleen has been observed to diminish in bulk after hæmatemesis or melæna, and probably most medical officers in India have met with similar instances.

F.—Affections of the bowels including Diarrhæa; Diarrhæa alba; Dysentery; morbid accumulations in the large bowels; Melæna; Hæmorrhoids.

Diarrhæa is one of the symptoms and results of the latter stages of malarious cachexia, and may depend either on affections of other organs, or on congestion or irritation of the intestines themselves. *Diarrhæa alba* has been already referred to as a consequence of suppression of function of the liver, and, as the name implies, is characterized by white *lienteric* stools, mostly occurring during the night or early morning. Dysentery which may be more or less chronic, or acute, is the usual termination of both the above conditions. It may, however, be present from the first, and has been attributed to the direct action of the malarious poison.

Morbid accumulations in the large bowels.—This is the condition so often observed in old Indians who have been subjected to continuous malarious influences. There appears to be originated a loss of tone and power in the muscular coats of the intestines, leading to distension and alternations of constipation and diarrhoea. In many instances, this local debility is part of the general cachectic condition, but it not unfrequently arises without very marked general blood deterioration. As it usually presents in elderly people, the natural debility consequent on age appears to combine with a moderate amount of malarious cachexy in producing the results. The symptoms of atony of the larger bowels are furred tongue, foetid breath, sallow complexion, and occasionally jaundice from mechanical pressure of accumulated faeces. There are generally scanty stools, alternating with diarrhoea, large and tumid abdomen, considerable distress from flatulence, and often hæmorrhoids. In some instances retained material may be clearly traced beneath the abdominal integument; and this is particularly evident when the cæcum, or sigmoid flexure, are the seats of accumulation. If these imparted faeces are permitted to remain, continuous diarrhoea, or even dysentery may be induced. The retained secretions, and fecal matters undergoing gradual decomposition, irritate the mucous membrane of the bowels, and sometimes induce inflammatory action, terminating in ulceration. Not a few retired Anglo-Indians are thus brought to the grave; the change of climate appearing to add to the intestinal torpidity present, and to render the bowels still less inclined to action, than in a warmer atmosphere. In addition to this, there is the frequent practice of having recourse to drastic cathartic medicines (often the patent advertised), still further aggravating any existing irritation. Contrary to our experience of the majority of ailments contracted in this country,

affections. of the larger bowels are more likely to progress injuriously after sudden removal to England, than if the change had not taken place. Hence the propriety too often ignored, of the Anglo-Indian so affected, changing climatic conditions gradually rather than suddenly.

It not unfrequently happens that the retained excretions and faecal matter from pressure on large blood vessels, give rise to anomalous sensations, as constant headache, giddiness, imperfect or double vision, *muscae volitantes*, or the appearance of sparks before the eyes, palpitation, and tinnitus aurium, which may be mistaken for indications of commencing cerebral disease. Such symptoms in connection with accumulation in the larger bowels, with the previous history of malarious fever, are, indeed, when occurring in an individual past middle age, sufficiently suggestive to demand careful attention. If in addition to this, we have loss of memory and diminution of intellectual power, with the history of a free liver, the probability of inter-cranial mischief, as referred to under the head ramollissement, is great indeed.

Melena, or intestinal hæmorrhage, is in my experience a more usual sequela of spleen and liver enlargement in this country, than hæmatemesis. And I have reason to believe that loss of blood frequently takes place *per anum* without either physician or patient being aware of the circumstance. Hence the desirability in cases of fever, and of convalescence from fever, and its sequelæ, of watching the condition of the alvine evacuations. Blood may exude from the intestinal mucous membrane, and pass away without the circumstance becoming known, unless the probability of such an occurrence is held in recollection. The dejecta are rarely noticed, unless attention is directed to this point by the medical officer; or, if noticed, may be regarded as the effect of medicine, or as

not worthy of mention. Few but the initiated would suppose the black or sometimes variagated evacuation of intestinal hæmorrhage to consist of blood. Even the older medical writers regarded such unnatural appearances as bile. When large quantities are suddenly passed, the probability of attention being directed to the proper quarter is of course greater. But small masses of blood may be lost daily, directly and greatly increasing the debility and cachexia of the patient. In all instances of malarious cachexia, and especially with evidence of spleen or liver affection, a diurnal inspection of the alvine dejectæ should be insisted upon. When the spleen is enlarged, it may also be well to mention the probability of the motions becoming suddenly black or dark. From the experience of several cases, I am inclined to believe that when splenic enlargement exists, motion, such as taking long journeys in wheeled conveyances, is very liable to induce intestinal hæmorrhage, and therefore this matter demands consideration when the question of the advisability of change of locality arises. I also believe that the passage of the blood through the mucous membrane of the intestines, gives origin to a susceptibility of that organ which not unfrequently terminates in confirmed diarrhoea, or dysentery, or predisposes to neuralgic pains.

Hæmorrhoids, both internal and external, are very frequently observed as results of malarious disease. In some instances they appear to originate from simple debility, and local weakness consequent on the cachexia. Sometimes their formation is hastened by alternations of costiveness and diarrhoea. They are very generally connected with that condition described, as depending on morbid accumulations in the larger bowels. When any hepatic obstruction exists, their formation is generally rapid and certain. When the elongated hæmorrh-

hoidal vessels once commence discharging bloody material, the additional strain upon the system is immediately felt. The daily loss of blood, although small, adds directly to the existing cachexia, and causes the case to assume a most serious aspect; while the frequent pain and rectal tenderness, consequent on the hæmorrhoids, prevent rest and sleep, and are constant sources of distress and annoyance. It occasionally happens however, that internal piles, bleeding every day, give but little uneasiness, and this source of weakness remains unsuspected, even by the patient.

9. *Affections of the peritonæum. Ascites.*

Ascites is found to be not unfrequently associated with disease and enlargement of the spleen, but in very many instances these alterations in the condition of the organ are not cause and effect. Both, indeed, may be consequences of portal obstruction, and I believe ascites following spleen affection, without any concomitant hepatic disease, is very rare. When the spleen has attained a very large size, there will always be some amount of fluid in the peritoneum, but this is the result of irritation and pressure, rather than of the diseased spleen *per se*. Affections of the latter organ do not lead to obstructed circulation like those of the liver. This is readily explained by a reference to the anatomy of the portal system of blood vessels. Anything tending to obstruct the passage of blood through the liver, would have a more direct effect in inducing effusion than when the spleen alone is in fault. I have occasionally observed *Ascites* occur in malarious cachexia, without any prior or accompanying liver or spleen disease. The signs of ascites are not liable to be confounded with other conditions excepting ovarian dropsy, the possibility of which should be borne in mind. The accumulated fluid may be serous or purulent.

CHAPTER IV.

- 3.—SEQUELÆ IN THE HEART AND ORGANS OF CIRCULATION, Including—A.—*Palpitatio*. B.—*Syncope*. C.—*Epistaxis*. D.—*Hæmoptysis*. E.—*Purpura*.
- 4.—SEQUELÆ IN THE BRAIN AND NERVOUS SYSTEM. A.—*Cephalalgia*—several varieties. B.—*Neuralgia*—varieties. C.—*Spasmodic affections*. D.—*Ramollissement*.
- 5.—SEQUELÆ IN THE ORGANS OF RESPIRATION. A.—*Bronchitis*. B.—*Pneumonia*. C.—*Phthisis*. D.—*Asthma*.
- 6.—SEQUELÆ IN THE URINARY ORGANS. A.—*Morbus Brightii*.—Frequently accompanying malarious disease.—Symptoms. B.—*Morbus Addisonii*.—Symptoms. C.—*Neuralgia of the kidneys*. D.—*Hæmaturia*. E.—*Irritable bladder*.
- 7.—SEQUELÆ IN THE ORGANS OF GENERATION AND IN CHILDBIRTH. A.—*Atrophy of the testis*. B.—*Uterine affections*. C.—*Parturition*.
- 8.—SEQUELÆ IN THE SKIN AND INTEGUMENTARY SYSTEM. A.—*Boils*. B.—*Lichen*. C.—*Secondary syphilitic skin diseases*.—D.—*Scorbutic ulcers*. E.—*Other skin diseases*. F.—*Leprosy*. G.—*Elephantiasis*. H.—*Anasarca*.
- 9.—JOINTS AND ORGANS OF LOCOMOTION. A.—*Rheumatism*.
- 10.—THE ORGANS OF SPECIAL SENSE. A.—*The Ear*. B.—*The Eye*.

3. IN THE HEART AND ORGANS OF CIRCULATION.

A.—*Palpitatio*. B.—*Syncope*. C.—*Epistaxis*.

A.—*Palpitatio*. B.—*Syncope*.—Palpitation of the heart, faintness, or actual syncope, occur as consequences and symptoms of the cachectic state. They however, like venous, arterial, and cardiac murmurs, are merely signs of functional disturbance, as when they present during chlorosis, dyspepsia, hysteria, and other chronic diseases. Organic disease of the heart and aorta undoubtedly occurs both among Europeans and natives in India, but there are no facts peculiarly connecting these affections with malarious degeneration. This question has been already referred to, in the article on "*Anæmia*."

C.—*Epistaxis*.—Hæmorrhage from other parts, as the nose and lungs are also occasionally noticed in persons suffering from malarious cachexia. In 1859, the Bheel Corps, on service in the province of Khandiesh, suffered more than ordinarily from one or other variety of paroxysmal fever. Among the men thus weakened, a large number of cases of both epistaxis and melæna occurred. Instances of the former affection occurring among the poorer classes attending a dispensary, will generally be found to have been preceded by a history of malarious cachexia too frequently combined with destitution. Such hæmorrhages are not characterized by a rapid flow of blood of true arterial colour, but the discharge is gradual, intermittent, and grumous in appearance.

D.—*Hæmoptysis* is less seldom observed as a sequel of malarious cachexia, than the other varieties of hæmorrhage named. But whenever any tuberculosis exists, or when softening has actually taken place, this complication is likely to occur.

E.—*Purpura*, particularly of the lower extremities, will present, when any scorbutic taint exists.

4. IN THE BRAIN AND NERVOUS SYSTEM.

A.—*Cephalalgia*. B.—*Neuralgia*. C.—*Spasmodic affections*.

D.—*Ramollissement*.

A.—*Cephalalgia* may occur as a sequel of malarious fevers, or as a consequence of such sequelæ. It may be due to simple debility, it may be symptomatic of dyspeptic conditions; or it may be true *cephalgia organica* dependent on changes within the cranium, the result of malarious disease. When headache occurs as a primary sequel of fever, it generally depends on debility, is attended with giddiness, and often increased by the upright posture. The pain is generally

diffused over the head, although sometimes presenting as *hemisrania*. In several instances where a syphilitic taint existed, I have remarked it more limited, and eventually terminating in pericranial node. Many persons who have never suffered from headache previous to attacks of malarious fever, become very subject to such ailments after convalescence from the febrile affection. The headache occurring as a sequel is very different from that congestive cephalalgia, forming one of the symptoms of the febrile paroxysm. It is described as more obtuse, but yet wearying and distressing. Another form of cephalalgia, occurring in those suffering under malarious influences, assumes a paroxysmal character. This pain may be general or confined to a particular spot. In the latter instance, as afterwards noticed, it may be a symptom of cerebral softening.

B.—*Neuralgia*.—Neuralgic affections of the supra-orbital, or other branches of the facial, and of the sciatic nerves, have been noticed as complications of malarious fever.¹ As sequels they present similar characteristics. Neuralgic conditions of other nerves not unfrequently happen as malarious sequelae. Of this an example has already been mentioned in hepatic neuralgia. Pleurodynia, pains in the abdominal parietes, and cardiac neuralgia, all complaints occasionally presenting in malarious countries, are referable to a similar cause.

C.—*Spasmodic affections*.—The influence of malaria on the induction of epileptiform attacks was mentioned in the article on "Malarious Fevers,"² and there indeed is little doubt, that such phenomena do present both as complications and sequelae of malarious disease. But the spasmodic motions more frequently observed; in the cachectic condi-

1. 2. *Indian Annals*. No XX.

tion, are of a minor nature. They may consist of twitchings of one or other organ, somewhat resembling a lesser degree of chorea: or of sudden startings of the limbs during sleep. Such maladies have been observed by Handfield Jones ¹, Peacock ², De. Pascale ³, and some other continental authors. But spasmodic or painful nervous affections do not appear to be so usually present in the malarious cachexia of India, as of other tropical climates. Or possibly the more phlegmatic temperaments of Anglo-Indians render them less liable to nervous maladies than the natives of some other parts of Europe.

D.—*Ramollissement*.—Softening of the brain is not an unfrequent result of the effects of long residence in the heat and malaria of tropical climates. If intemperance has been persisted in, or even when spirituous liquors have been used freely, but not in excess, the probability of ramollissement occurring is greatly increased. As this condition presents in persons, who do not evidence malarious cachexia, I believe the debilitating effects of heat alone will induce this insidious change. When, however, in elderly Anglo-Indians cachexia has commenced, affection of the brain is rendered much more probable. The symptoms are pain in some part of the cranium generally fixed, sometimes intermitting with acute paroxysms; loss of memory and intellectual powers; emaciation; intermittent pulse. But in some cases the pain is little complained of, and the malady progresses in an insidious manner. Such instances are very frequently accompanied by that condition referred to, as “morbid accumulation in the larger bowels.”

¹ Jones on *Neurolytic or Aguish Disorders*.

² Peacock on *Malarious Affections*. *Med. Times*, Oct., 1859.

³ De Pascale. *Curious effects of Malaria*. *Brit. and For Journal*. 1861.

5. IN THE ORGANS OF RESPIRATION.

A.—*Bronchitis*. B.—*Pneumonia*. C.—*Phthisis*. D.—*Asthma*.

A. B.—*Bronchitis* and *Pneumonia*, have been already referred to, as complications of intermittent and remittent.¹ The remarks then advanced are applicable to these affections, when they occur as sequelæ of such diseases. During malarious cachexia, the native is more liable to become the subject of chest complications than the European, and the inhabitants of the northern portion of the peninsula than the southern. The insidious form of pneumonia, without the characteristic sputa, in which the disease presents in the native, should be held in recollection.

C.—*Phthisis*.—Similarly the remarks on phthisis are here applicable. The insidious nature of lung disease in the native of India was formerly insisted upon, and the fallacy of the idea that this malady and malarious disease were antagonistic exposed. I believe paludal cachexia will excite latent scrofulous taint into action ; or, when confirmed phthisis is present, it will not fail in aggravating and rendering the progress of the disease more rapid.

D.—*Asthma* has also been recorded in a periodic form, and when so occurring has been considered due to malarious influences. Dr. Bird² reports a case of this description, and regards it as an instance of metastasis from ague and fever, to asthma. I have not met with instances of the latter disease, which could be fairly traced to malaria. But recollecting the well-known effects of the emanations from newly mown hay, and the certainty that metastasis of gout sometimes takes place to the air passages, the theory that

¹ *Indian Annals*, No XX.

² Bird's *Remarks on Malaria*. *Ind. Med. Gazette*, March, 1866.

malaria may occasionally induce a spasmodic form of the disease, is not unworthy of acceptance.

6. SEQUELÆ IN THE URINARY ORGANS.

A.—*Morbus Brightii*. B.—*Morbus Addisonii*. C.—*Neuralgia of the kidney*. D.—*Hæmaturia*. E.—*Irritable bladder*.

A.—*Morbus Brightii*.—It has already been remarked, that affections of the kidney characterized by albuminous urine, may be excited by the congestion taking place in the kidneys, in common with all abdominal organs, during paroxysmal fever. And these may be of two kinds, either temporary congestion, passing away in the course of a few days or weeks, or the chronic form terminating in deposition between the cortical and tubular structures, attended perhaps with absorption of the renal tissue proper. Frequent attacks of congestion gradually and imperceptibly lay the foundation of the chronic malady. The latter, however, may arise as a result of chronic malarious degeneration, without the additional exciting cause of prior fever paroxysms. It is well known, that impure air and other unwholesome influences, to which the inhabitants of large towns are subjected, are fertile predisposing causes of one or other of the forms of albuminuria. And in India we have added another debilitating agent in the presence of malaria. If the urine passed during or immediately after a fever paroxysm is examined, it will very frequently, indeed, show evidence of albumen. When fever becomes habitual, or of frequent recurrence, albumen is more constantly present. In the more severe forms of malarious cachexy, albuminous urine is quite as often present as absent. As an examination of the urinary secretion in such cases is not a common practice, the passage of albumen during these maladies is not recog-

nized as an ordinary occurrence. But any medical man may satisfy himself as to the correctness of these statements by applying the albumen tests. When there is tendency to the scrofulous diathesis in a constitution deteriorated by malarious cachexy, the kidney affection may be foretold with almost certainty. Or, if in Europe an individual has suffered from albuminous urine, consequent either on congestion or more chronic conditions, the recurrence of the malady, under malarious influences, is most probable. I mention this with emphasis, because it is diametrically opposed to the opinions entertained, but a decennial period past. Change to semi-tropical or even tropical climates, was commonly regarded as beneficial in Bright's disease. The question sometimes presenting, whether a person, once the subject of this malady, should or should not proceed to India, has, I have reason to know, been decided in the affirmative by eminent living physicians. Some, indeed, have even recommended the change. Experience has, however, convinced me, that tropical, semi-tropical, and malarious countries, should be forbidden lands to all who have ever passed albumen in the urine; unless an accidental occurrence depending on errors of diet. If the kidney has been once congested or inflamed, or if chronic degeneration has commenced, the danger of confirmed albuminuria, resulting from paroxysmal fever or malarious cachexia, is great indeed. The idea once prevalent at home that albuminuria is not a malady of hot climates is totally erroneous. It is as common, if not more so, in India as in England. This has, indeed, been admitted since the publication of Moorhead's work. But this author, while attempting the elaboration of an etiology for the malady, almost altogether ignores malarious influences. The influences of occupation, of vicissitudes of temperature, of spirits, opium, and gunjah, are noted as

they deserve. But they at least, as powerful actions of congestive fever and malarious cachexia, are allotted a very minor position. It is certainly difficult to separate the effects of malaria from the other causes named, as they are so frequently combined. But there can be little doubt that the deleterious results of malaria, either through the actual fever paroxysm or through malarious cachexia, are more than sufficient to counterbalance any advantage derived from residence in a tropical climate. In the latter, either with natives or Europeans, the actual exposure to vicissitudes of weather, or to cold; may be less; the habits of drinking spirits, especially gin, may not prevail; and scarlatina, so frequently the forerunner of albuminuria, may be unknown, but notwithstanding such conservative influences, the tendency to disease of the kidneys is more than equalized in India by the constant presence of malaria.

The symptoms of albuminuria, as it occurs in its chronic form, as a consequence of malarious cachexia, are obscure pains in the loins, frequent micturition, especially at night, and more confirmed debility. The urine is generally scanty, assumes a muddy appearance, has a low specific gravity, and furnishes albumen by the usual tests.

When the peculiar cachexia the result of Bright's disease is recollected, the uræmic blood poisoning, with its dropsical, cerebral, cardiac, and other secondary affections, the exceeding gravity of the complication of albuminuria and malarious cachexia will be admitted.

Morbus Addisonii; or *supra-renal melasma*.—I believe morbid conditions of the supra-renal capsules sometimes, if not frequently, result as a portion of that general degenera-

tion, which we designate malarious cachexy. In two cases at least, *post mortem* examination has shown enlargement (scrofulous?) of the supra-renal capsule co-existent with malarious debility, spleen affection, and death by dysentery. The characteristic bronzing of the skin is not, however, so readily noted in the person of most tropical invalids, in consequence of the frequent sallow complexions, the result of liver affections, and other changes masking it. In the native, moreover, the discoloration of the skin, dependent on, or at least occurring with, super-renal capsular disease, could never form a diagnostic mark. The more important characteristics of the *morbus Addisonii*, as detailed by the authority after whom the affection is named, are those of anæmia, *viz.*, a progressive but gradual feebleness of the patient, irritability and feebleness of the heart's action, and more or less dyspeptic symptoms. "With every sign of feeble circulation and general prostration, neither the most diligent inquiry nor the most careful physical examination, throws the slightest gleam of light upon the precise nature of the patient's malady." In this the affection much resembles the simple anæmia arising from malarious degeneration. When anæmia occurs in individuals who have never resided in extraordinarily malarious localities, and who have not been long in tropical climates, the probability of super-renal degeneration is worthy of consideration. And the still greater probability of these organs partaking in the general degeneration of confirmed malarious cachexia, will, I believe, be proved by the result of future *post mortem* research.

C.—*Neuralgia* of the kidney has also been occasionally noticed as one of the results of malaria. After attacks of ague, a dull, perhaps intermittent, pain over the region of the

kidneys or of one kidney is felt. Dr. Bird¹ reports a case of this description and remarks, that had the periodic affection of the gland continued to recur for a series of days, it is probable that the case would have terminated in some deep-seated disease of the organ. I have never myself noted any kidney affection following malarious fever which I should term neuralgic. I believe when this part is affected, as the result of malarious saturation, that it is always more or less congested, and that a probability of the commencement of organic degeneration exists.

D.—*Hæmaturia*.—A discharge of blood *per urethram* has been frequently noticed during the progress of malarious fevers. Sometimes the colouring matter appears to be derived from the kidneys, at others from the mucous membrane of the bladder or urethra. In hæmaturia, occurring during malarious cachexia, I believe the latter to be the most usual localities from which the blood escapes. Hæmaturia may be expected in that class of cases, where a scorbutic taint exists, and when purpura or typhoid symptoms have occurred.

E.—*Irritable bladder*.—This condition of the organ marked by frequent inclinations to pass urine, perhaps combined with some degree of spasm, is not unusually present in malarious cachexia. It may be merely the result of the general debility, or it may depend upon triple phosphatic deposit, or on albumen in the urine. Hæmorrhoids, or uterine ailments, may also be the exciting cause.

7 ON THE ORGANS OF GENERATION AND ON CHILDBIRTH.

A.—*Atrophy of the testis*. B.—*Uterine affections*. C.—*Parturition*.

¹ Bird's *Remarks on Malaria and some of its Effects*. *Ind. Med. Gazette*, March, 1866.

A.—*Atrophy of the testis*.—More or less diminution of size of the testis is a frequent accompaniment of malarious degeneration. When the gland is not sensibly diminished in size its function is lessened, or perhaps totally lost. Neuralgia of the part is also occasionally noted. It is unquestionable that these conditions of testis depend on the general debility present.

B.—*Uterine affections*.—In the article on "Fevers," the effects of the paroxysm, of climate, and of habits of life on the womb were considered. All uterine maladies, so prevalent in India, as uterine congestion, dysmenorrhœa, ulceration of the cervix, are aggravated if present, often induced if absent, when malarious cachexia is established. Miscarriages are also rendered more frequent by this condition; and mischances of the latter description occurring, the probability of recovery from the malarious cachexia is still further reduced by the consequent increased debility.

C.—*Parturition*.—The influence of a malarious saturation of the blood on the act of parturition is greater than it would *a priori* appear. While the anæmic condition tends directly to prevent the *fœtus in utero* attaining the average size, weight, and strength, the tissues of the mother become soft, flaccid, and yielding. Hence the small, ill-nourished infants, so often brought forth by the anæmic female. Hence also the "easy" labours of many women in this country. Although the reasons are not understood, the latter fact is so well known, that many European females prefer confinement in India rather than in Europe. But the comparative freedom from temporary suffering so obtained is purchased at some risk. In anæmic females, the tendency to uterine hæmorrhage is always present, the spontaneous contraction of the womb appearing to be in a great measure regulated by the healthy

or depraved condition of the blood. And should actual hæmorrhage not take place during labour, the uterus is slow in assuming its normal unimpregnated condition. Bloody discharges are continued for weeks, "bearing down" pains are complained of, and not unfrequently some degree of prolapsus results. As with the European female, so with the native, malarious cachexia adds greatly to the risk always attending parturition, and is influential in the induction of those manifold uterine maladies, from which so many of the native women suffer.

8. IN THE SKIN AND INTEGUMENTARY SYSTEM.

- A.—*Boils*. B.—*Lichen*. C.—*Secondary syphilitic skin disease*.
 D.—*Scorbutic ulcers*. E.—*Other skin diseases*. F.—*Leprosy*.
 G.—*Elephantiasis*. H.—*Anasarca*.

A.—*Boils*.—"Successive crops of boils," called by Peet, "a troublesome but unimportant disease," are very frequently symptoms of malarious cachexia. They form in various parts, on the body or the limbs, are generally small, but sometimes attain a considerable size. The actual formation of pus tends to further debilitate the patient, while the suffering and pain these small abscesses occasion, irritate, destroy rest, and render the downward progress more certain and rapid. Boils, perhaps, more frequently affect elderly people suffering from malarious cachexia than younger subjects, although common enough in the latter. It has occurred to me to see patients die apparently from the effect of a succession of boils, the result of malarious cachexia, but the individuals so succumbing were elderly persons. Natives suffer from this affection perhaps to a greater extent than Europeans, as the effects of insufficient food are more frequently super-

added to malarious influences in their cases, than in those of the latter. Furunculæ, resulting from malarious cachexia, should be distinguished from those formations so frequently occurring in the persons of Europeans newly arrived in the country, or more rarely in healthy Europeans suddenly changing the dry climates of the Mofussil for the damp atmosphere of the sea-coast. When boils occur under these conditions, they are more frequently connected with plethora than anæmia.

B.—*Lichen tropicus*, so common in India and associated in the public mind as “a sign of good health,” may and does also occur in other than robust habits. I have frequently seen this eruption cause much suffering to persons in an advanced stage of malarious cachexia. The frequency of lichen accompanying broken down or feeble health is remarked upon by Nayler ¹ (formerly of the Indian Service,) in his recent work on “Diseases of the Skin.”

C.—*Secondary syphilitic skin diseases*.—Should there be any syphilitic taint in the system, tending to manifest its presence through the integumentary surface, malarious anæmia will aid the animal poison in the induction of the usual results. The syphilitic virus appears to acquire renewed virulence by the association with paludal degeneration.

D.—*Scorbutic ulcers*. Similarly, where tendency to scurvy exists, scorbutic manifestations are always excited and intensified by the influence of malaria. Throughout these papers, the frequent blending of syphilis, scurvy, and malarious cachexia has been insisted upon; each one reacting on and aggravating the other. It was also mentioned in the paper on “Remittent,”

1 *Diseases of the Skin* p. 76, 1866.

that there is strong reason for attributing such complaints as the Aden ulcer, the Delhi sore, and the Scinde boil, to the results of a combination of malarious cachexia and scorbutic degeneration.

E.—Other skin diseases.—Any cutaneous affection, dormant in the system or present in a scarcely noticeable form on the skin, will be aggravated and excited to renewed action by malarious cachexia. The cutaneous maladies, thus more frequently seen in association with the latter degeneration, are one or other of the varieties of eczema. The frequency of the occurrence of this cutaneous affection during masked malarious fever has already been mentioned. Psoriasis is less often seen. One or other of the forms of porrigo or impetigo are frequent in children. Scabies, again, is often present in natives, the subjects of malarious cachexy. The degenerated fluids appearing to afford all required by the acarus.

F.—Leprosy.—This affection, although undoubtedly a blood disease, often shows itself without prior constitutional symptoms having been noticed. When elephantoid fever has not occurred, the first symptoms are referable to the skin, and as this is so often the case, the malady, as connected with malarious disease, may be considered under the head of the integumentary system. It has indeed been argued that leprosy is nothing more or less than hereditary syphilis aggravated by malarious influences, or other deteriorating causes, such as defective diet, filth, scurvy, and exposure. However this may be, there can be no doubt that the two maladies, leprosy and syphilis, frequently co-exist, and that any deteriorating agent acting in addition to the former, will, as with the latter, aid in the onward progress of the disease

Hence that combination of slowly advancing leprosy and malarious cachexia, so frequently fatal among the natives of this country.

G.—*Elephantiasis*.—Similarly elephantiasis, although a blood disease (perhaps the same as leprosy) frequently first manifests its presence by the local affection. Like leprosy, elephantiasis has been also attributed to malaria. It is argued that the disease abounds in malarious localities, such as rice producing countries; that elephantoid intermitting fever has been observed prior to local swelling; and that according to Waring, the rule is “no fever no swelling.” It is also remarked that spleen disease and leucocythæmia, are frequently associated with elephantiasis, and that anti-periodics are the most effective remedies. Others again are disposed to regard elephantiasis as a syphilitic manifestation. A consideration of these points is not however now desired. It is sufficient for our present purpose to recognize the fact, that should predisposition to elephantiasis exist, malarious saturation will assuredly hasten and aggravate the disease.

H.—*Anasarca*.—More or less cedema of the feet, and sometimes of the hands, may exist consequent on pure debility. When, however, anasarca becomes general, some more potent cause will be in operation. General dropsy resulting indirectly from malarious cachexia, may be due to cardiac, renal, or hepatic disease, and will of course only occur in the latter stages.

9. JOINTS AND ORGANS OF LOCOMOTION.

A.—*Rheumatism*.—Rheumatic pains, or pains simulating rheumatism are, as was formerly noticed, sometimes the

1 In the article on *Remittent*. *Ind. An.* No. XX.

precursors, more frequently the accompaniments, and always the sequelæ of malarious fevers. Such pains also occur in malarious anæmia, and in almost every condition resulting from or aggravated by that state. Articular rheumatism occurring from cold or exposure acting on a cachectic habit, must be distinguished from that painful affection—the direct result of malaria in the blood—and which as just mentioned, sometimes ushers in fever. It is indeed, questionable if this pain is *de facto* rheumatism, although generally spoken of as such. Instead of attacking the joints, it prevails throughout the limbs, and in the sequelæ of malarious fevers, is frequently a source of much suffering. In many instances it is not distinguishable from concurrent syphilitic pains. Rheumatism of either description, occurring in a cachectic habit, is one of the most intractable chronic diseases we meet with among natives.

10. IN THE ORGANS OF SPECIAL SENSE.

A.—*The ear.* B.—*The eye*

A.—Noises in the ear and partial deafness are very frequent complaints of those who have suffered much from malarious fevers. Such defects are also often noticed as accompaniments of malarious cachexia. I have also known permanent singing in the ears and partial deafness originate after one attack of intermittent of but moderate intensity. As previously mentioned, it is a frequent symptom of masked fever. As often as not these ear affections are attributed to the effects of quinine, taken to cure the fever. I do not, however, believe permanent singing in the ears or deafness is the result of the action of quinine. Doubtless the alkaloid will induce these results temporarily. But they have not been noticed as permanent after the exhibition of quinine for other maladies, or in large doses for the purpose of

experiment. Moreover, I have seen persons complaining of singing in the ears and partial deafness, who had not taken quinine at all. The abnormal condition of the auditory structures depends, I believe, on chronic inflammatory action, leading to thickening of the Eustachian membrane, and perhaps of the whole lining of the internal ear. The symptoms are precisely similar to those described by the late Mr. Toynbee, as characteristic of subacute and chronic inflammation of the internal ear. As a general rule these ear maladies following fever are never thoroughly recovered from. They may at first be so slight as scarcely to attract the notice of the person affected, but the foundation is laid of those changes, which sooner or later result in more or less deafness. When singing in the ears is permanent, it may, as well as deafness, be common to both ears, but has, in my experience, been more usually limited to one organ only. The noise and defect of hearing are also more felt after fatigue, either mental or physical, or when food has not been taken at the usual time. These last facts would appear to indicate the auditory nerve was implicated in diseased action. As noticed, when mentioning singing in the ears as a symptom of masked fever, the peculiar noises are always more apparent during the silence of the night. A person affected with a severe form of ear-singing, cannot distinguish the chirp of a cricket a few yards distant from the noise the malady causes him, either to hear or to suppose he hears.

B.—*Ophthalmic* maladies sometimes present as a sequel of malarious fever. This many medical men are, I am aware, disposed to question. But I believe that, especially in India, conjunctivitis and sometimes iritis are indirectly consequent on malarious cachexia. The characteristics of eye affections,

depending on such causes, do not differ from those of similar maladies otherwise originated. When, however, ophthalmic disorders occur in the subjects of malarious cachexia, the relief of the latter will alone permanently benefit the former. Most writers on ophthalmic medicine and surgery, recommend quinine or other anti-periodics, as valuable in obstinate affections of the various tunics of the eye, and the value of such agents evidently depends on the influence they exert over the general system. When ophthalmic disorders occur as a sequel of malarious saturation, conjunctivitis is the condition most commonly presented. This may, indeed, either alternate with paroxysms of ague, or in other instances appears to take the place of the fever. The *matrices morbi* may be then presumed to attempt escape from the system: as it is supposed to do in other instances, as *via* the mucous membrane of the intestines. But that conjunctival disorder occurring as a sequel, is, I believe, more a local manifestation of extreme debility, than the result of specific poison in the blood. When venereal taint exists, determination to the eye is liable to occur. Dr. Bird describes a remarkable instance of iritis following fever, and commencing, as usual, by conjunctival affection.

CHAPTER V.

TREATMENT—

Of malarious anæmia—Value of quinine—Of iron—Of diet—Of spirits—Change of climate—Leucocythæmia—Enlarged spleen—Remedial agents—Mercury—Change of climate—Sea voyage—Diarrhoea alba—Hepatic affection—Value of nitro-muriatic acid bath—Other remedies—Suppression of function—Dyspepsia—Other maladies—Influence of the Furlough Regulations as a means of prevention of disease.

The treatment of malarious anæmia either following attacks of fever, or originating spontaneously, is sufficiently

simple. A tonic stimulating *régime* is decidedly necessary. I do not believe quinine alone exerts any peculiar beneficial influence in this condition of system; but, combined with preparations of iron, I am disposed to regard it as beneficial. The admixture of the two remedies is more advantageous than either one administered alone. The condition of the bowels will generally require regulation by alterative doses. But medicine has, indeed, very little effect in malarious anæmia. More benefit is derivable from a proper system of dieting. The food should be generous, containing a large amount of animal matter, and accompanied by a fair proportion of stimulants. The value of fermented liquor in malarious cachexia has been recently recorded by the African traveller, Sir Samuel Baker. After years of deprivation, during which no kind of fermented liquor had been available, he arrived at Kam-rasi, in a very debilitated state, consequent on repeated attacks of fever. Here spirit was procured in the shape of sweet potatoe whisky. The author writes—"Every day I drank hot toddy. I became strong, and from that time the fever left me."¹ Neither was this due to change of climate, as he remained in malarious localities long after this occurred. Spirit, however, cannot be expected to produce this fortunate result in all cases. But I feel convinced that a moderate allowance of beer and wine will not only delay the approach of malarious cachexia; but also retard its progress when present. In many cases, however, the condition of the patient passing from bad to worse, and probably the debilitating effects of some supervening malady being superadded, the question of change of climate forces itself forward. When anæmia is confirmed, I believe a radical change only will afford permanent benefit. Journeys to the hills or sea-coasts may produce temporary relief, but return to duty and a malarious district is quickly

1 Baker. *The Albert Ngansa*. Vol. II., p. 245.

followed by accession of anæmia. If the condition assumes the more advanced form of leucocythæmia, the urgency of radical change of climate is greater. Should this be long delayed, the digestive powers fail, and those organic changes take place, which even a temperate climate will never thoroughly eradicate. In the anæmic native, change of climate by removal to other parts of India is equally necessary.

The treatment of enlarged spleen resolves itself into endeavours to prevent paroxysms of fever, or otherwise when these have ceased, or have not occurred, to renovate the deteriorated blood. Nothing so surely leads to diminution of the volume of the enlarged spleen, as measures calculated to improve the condition of the blood. Medicinal treatment will, therefore, consist in the exhibition of tonics, as iron quinine and strychnine, and in regulating the bowels. The tonic aperient long since used by Twining and Schulbrød is also sometimes of much service. Twining's spleen mixture is composed of jalap, ginger, columba, rhubarb, and bitartrate of potash, of each $\mathfrak{z}\text{i}$, sulphate of iron $\mathfrak{z}\text{i}$, tinct. sennæ $\mathfrak{z}\text{iv}$, mixt. water $\mathfrak{z}\text{x}$, the dose being $\mathfrak{z}\text{ss}$ three times a day. This combination sometimes acts rather violently on the bowels, and if so, is more productive of harm than good. In smaller quantities it may, however, prove beneficial. But, as a general rule, all depletory measures, as the use of drastic purgatives, or leeches over the spleen are distinctly contra-indicated. The latter will only increase the prevailing cachexia and debility, and the former in the existing weak condition, may excite diarrhoea or dysentery, to both of which predisposition always exists. Iodine and its preparations, used either internally or externally, have been in my hands inefficacious, and the same may be remarked of bromine. Mercury is now generally admitted to be actually injurious in spleen affections. The changes

effected in the blood by mercury, have indeed been supposed to be not very different from those actually caused by malaria, "both being favourable to degeneration and destruction of tissue, and unfavourable to repair." Theoretically the practice of using such an agent as mercury would appear correct, if the mineral is merely regarded as an agent promoting the absorption of lymph, and abnormally deposited tissue of low organization. But we cannot now confine our ideas of the mercurial action to this. It undoubtedly induces, particularly in a debilitated habit, a still greater blood deterioration. It reduces the volume of the blood by its purgative properties, and it impoverishes the blood by its action on the red particles. Neither does it *necessarily* counteract inflammatory action or promote the absorption of lymph, especially in debilitated constitutions, or in the later stages of disease. This all will admit who have seen pericarditis, iritis, inflammation of the meninges, or peritonitis, terminate unfavourably, although mercurial saliva had flowed copiously from the mouth. Again, when suppuration is impending, there appears little doubt that mercury will rather hasten than retard that process. And although abscess of the spleen is rare, still the deteriorating and unfavourable action of the mineral is not calculated to diminish the number of instances in which pus forms, either in the liver or spleen. I do not intend to assert, that the knowledge of an individual having a large spleen should deter from the use of mercury, if the constitution is unimpaired, and the mineral is positively necessary for *other* accidental affections. But when tendency to anæmia exists, and especially if the gums are spongy, the complexion pearly or sallow, with disposition to diarrhoea and dysentery, even alterative doses are inadmissible. Mr. Scriven however states, that he has

salivated for other diseases many persons whose spleens were of large size, without any resulting bad effects referable to the mercury.

Similarly, the application of blisters and other counter-irritants are not adviseable in the asthenic condition of system, neither do they appear to effect much benefit previous to the establishment of this state. In very debilitated subjects and in children, there is probability of sloughing or even ulceration as the sequel. Mr. Macnamara states that the biniodide of mercury (applied over the spleen as recommended by Major Holmes for the cure of goitre) will be found of great use in reducing the volume of the organ. But in my hands the biniodide, although used until vesication was produced, has not been followed by good result. It appeared to produce no more effect than iodine paint, or any other irritant. I do not believe any medicine applied locally exerts appreciable influence on enlargement of the spleen. But I think wearing a moderately firm bandage will tend to hasten diminution of volume, and this I am now in the habit of recommending. Finding however, that many classes of patients have no confidence in so simple a remedial agent as pressure, I generally order the emplastrum robrans of the London Pharmacopœia, to be laid over the part, and the bandage afterwards applied.

During the malarious seasons of the year, or during all seasons, in specially unhealthy districts and years, spleen disease generally increases in gravity, notwithstanding any kind of medical treatment. Cold, wet, damp, and other causes, tending to induce return of paroxysmal fever, will maintain or aggravate spleen affection. In such cases change of climate is the only remedy. The native may be sent into districts where the rain fall is moderate, and the variations

of temperature comparatively inconsiderable. In the Bombay Presidency the Deccan table-land appears to be best suited for such cases. When Europeans are the subjects, change of climate is a still more urgent necessity. In less serious cases, certain hill-stations during the hot months, and the sea-coast in the cold weather, may be productive of benefit. But in all probability, such amelioration will prove temporary, and return to the former locality will be followed by accession of disease. Some hill-stations, moreover, are not adapted for such cases. Mount Aboo, for instance, is, during the autumnal season, eminently malarious, and persons liable to paroxysmal affections not unfrequently suffer from return of their malady. The same is true to a lesser extent as regards Nynce Tal and Ootacamund. In all cases of enlarged spleen with cachexia, a more radical change of climate is demanded, than that afforded by Indian hill regions. When the individual does not dislike a sea life, and is not troubled by sea-sickness, a voyage, as round the Cape, will often prove very beneficial. When, however, sea-sickness, as with many individuals, is constantly induced by the least motion, a sea voyage will not be advisable. The repeated nausea, not only prevents a due amount of nourishment being taken, but the act of vomiting has a directly irritating effect on any enlarged abdominal organ, whether liver or spleen. This I noticed during my service in the Indian Navy, keeping a debilitated person on board ship, even if not actually sea-sick, but simply nauseated or dreading sea-sickness, has in my experience delayed progress towards health. Sailing within the tropics also, as frequently recommended, is productive of very little permanent benefit. For all Europeans, suffering from enlarged spleen and cachexia, the change to the temperate parts of Europe, or, still better in the summer season, to the British Isles, should be insisted on. But the journey to the latter

should not be undertaken at unseasonable periods of the year ; and the vicissitudes of European winter and spring weather should thus avoided. Great attention to clothing is also necessary, and a person so situated can scarcely dress too warmly, or take too great care to avoid sudden cold and chills. In the most favourable circumstances, months often elapse before existing œdema of the feet even departs, and a still longer period is required for the recovery of a healthy colour, a robust habit, and to permit the subsidence of the spleen. Chronic diarrhœa marked by light coloured stools, is not unfrequently a sequel of spleen disease removed to temperate climates, or to the Indian mountain ranges, and this is especially the case when the liver is also implicated. Imprudence in diet and exposure appear frequently to excite this peculiar *diarrhœa alba*, which often assumes, as the records of Martin's cases evidence, a very serious form in the cachectic European returned home from India.*

It will probably be remarked, that the use of quinine has not been recommended for the cure or relief of enlarged spleen. As a tonic this remedy may exert some slightly beneficial effect, but I do not believe it has any specific influence either on enlarged spleen, malarious cachexia, or any other condition resulting from paludal saturation. I cannot call to mind a single case of this description in which quinine, whether given in large or small doses, produced any appreciable beneficial effect. A firm believer¹ in the efficacy of this alkaloid as an anti-periodic writes thus :—"I am disinclined to use large doses when there is much anæmia present, from having more than once witnessed very alarming collapse induced by them." Sir Ranald Martin² again

1. Peet. *Practice of Physic*.

2. Martin on *Tropical Climates* p. 290.

does not speak favourably of the result of giving quinine for enlarged spleen or malarious cachexia. He mentions that neither by the mouth nor *per rectum*, as recommended by continental practitioners, has the exhibition of quinine in such cases been "established on the foundations of success." Other remedies recommended for enlarged spleen are the iodide of lead administered internally, and also applied as an ointment over the organ; the *Kala nimmuk* or coloured salt of the Indian bazaars, consisting chiefly of muriate of soda, with a little sulphur, lime, and a small proportion of oxid of iron; sulphuric acid in five drop doses; nitric acid in similar quantities; a mixture of aloes, vinegar, and garlic with a portion of kuzces or bazaar sulphate of iron; sulphate of iron given alone. In cases where there is tendency to scurvy, lime juice will exert a beneficial influence on the spleen.

Bundaal, *Bindaal Kerula*, or *Luffa Echinata* an indigenous plant belonging to the N. O. Cucurbitaceæ has latterly been recommended as a remedy in spleen disease.¹ The seeds are said to be powerfully drastic, but an infusion of the stalks less so. The dose is ʒi to ʒii of the latter, which should be made by steeping three drachms of the stalk in a pint of water, allowing it to stand for two hours. It is stated, the greatest possible care should be taken to free the stalks from all other parts of the plant, and particularly from the seeds, as in instances where such precaution has not been taken all but fatal results have ensued. Dr. Dickinson who recommends this preparation states, that he has used it with advantage in cases of simple tumefaction of the spleen, the result of frequent attacks of fever, also in intermittent fever and neuralgia.

1. *Ind. Med. Gazette*. Nov. 1st, 1866.

In those instances where the liver participates in the deterioration, and, as generally happens, has become enlarged, much confidence has been placed in the nitro-muriatic acid bath so highly recommended by Martin. This author writes—“Owing to the hepatic complication, quinine and chalybeates prove ineffective to the cure of the splenic, while they injure the hepatic, disease,” and several instances are detailed of rapid subsidence of enlarged spleen, liver, and anasarca, on the use of the acid bath, combined with nitro-muriatic acid and bitter infusions internally. It is also stated, that the bath acts more forcibly in hotter than in colder seasons and climates, my experience does not permit me to endorse the opinions of those who write decidedly of the efficacy of this acid bath, I have frequently used it, both in this country and at home, and cannot avoid the conclusion that a simple warm bath administered in a similar manner, is quite as efficacious. I believe both act by opening the pores of the skin, and promoting the elimination of morbid material, and I have not observed that loose condition of the bowels said to follow the bath and relieve the system. Nitro-muriatic acid given internally has, however, appeared to act beneficially; not from any specific effect on the liver, but from the influence it exerts on the digestive organs and on the dyspeptic symptoms, invariably accompanying the conditions of liver, for which it is generally prescribed. The indications of treatment are in fact the same as when spleen-affections only exist: that is to support the strength and digestive powers, and so reduce cachexia. It is, however, advisable when the liver is affected, to have recourse more frequently to laxative remedies calculated to unload the portal system. Both drastic cathartics and mercurials are decidedly injurious. The best aperients in these conditions are, I believe, podophyllin and small doses of neutral salts, as sulphate of

potash. The quantity of such agents prescribed, must not however be large. As with spleen disease, so with liver affection, I regard change of climate as the only certain means of relief.

When suppression of function occurs, laxative medicines, if costiveness prevails, are frequently efficacious. But if the condition described as *diarrhœa alba* supervenes, laxative remedies will not prove beneficial. Tonics and astringents, with careful attention to diet, and these failing, change of climate are required. Dyspepsia again, can only be satisfactorily treated with reference to its cause, but symptoms may be alleviated by the remedies usual in such cases, and which need not be here detailed. Similarly, affections of the stomach, whether subacute inflammatory action or discharge of blood, may be relieved, but will only be thoroughly removed by recovery from the malarious cachexy. Morbid accumulations in the large bowels are perhaps more benefited by the daily use of an enema syringe, than by any other treatment. Melæna and hæmorrhoids are also susceptible of relief, but not of cure, without removal of the malarious condition. So long as the latter remains, the former once excited may be expected to prevail periodically. And indeed the same may be stated with reference to any of those sequelæ mentioned in this paper. All are, more or less, susceptible of relief by the remedies usually applied when they occur unconnected with malarious degeneration. None, however, are radically cured, unless this cachectic condition is first removed. In the great majority of instances, medicinal agents are powerless to effect this. Change of climate then becomes the only remedy; for the European to Europe; for the native to some more healthy part of Hindoostan. And my experience tends to demonstrate that such removal is too often

delayed until too late; or until the change can only be followed by partial benefit, either the *res augusta domi*, or other causes prevent recourse being had to the only sure hygienic measure, while it is yet sure. Valuable time is lost in trying medicines, proved in innumerable previous instances to afford but temporary relief; and the hills are too often resorted to, when the more radical change is required. As regards European soldiers, the principle is now acknowledged, that prevention of disease is better than cure. I believe the same applied to the furlough rules would benefit both the State and its servants. We now by regulation use furlough to Europe as the means of cure. Were furloughs available at shorter intervals and facilities afforded to officers wishing to avail themselves of the indulgence, the prevention of much malarious disease would be accomplished, and the large number visiting Europe on sick certificate be reduced to the *minimum*.

CLINICAL OBSERVATIONS IN SURGERY.

BY

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No. XXXIV.—HYPERTROPHY OF THE TONGUE.

THIS affection, occurring independently of acute inflammation of the organ, is so rare in this country that I only remember to have seen one case, the particulars of which are here detailed.

The disease is considered by some authorities to be usually, if not always, congenital, and cases are recorded where it was observed in young infants, who were born with their tongues hanging out of their mouths. In others it made its appearance in early life, or at all events was first noticed then, and may perhaps have been congenital, as a slight amount of hypertrophy might escape observation in infancy. But it would appear that the disease may supervene at a later period. In the present case, there is nothing to show that the patient had any abnormal condition of the tongue for the first fifteen years of his life. The condition can hardly be called one of true hypertrophy; for had the increase in size been due to textural changes of the nature of true hypertrophy, it

would not have yielded so readily to the simple treatment by pressure that was adopted. It must rather be regarded in the light of a swelling or infiltration of the soft vascular tissue of the tongue, combined, no doubt, with a certain amount of tissue change, the result of textural irritation depending on some obscure cause.

It is to be regretted that he could not be detained in hospital long enough to observe whether complete restoration to the natural dimensions could be accomplished, and also whether any improvement could be effected in the distorted lower jaw; but he was so much pleased and satisfied with the progress, that he had made during his stay in hospital, that he could not be induced to remain longer. It is probable that the removal of a triangular portion, including the apex of the tongue, would have relieved him more speedily and effectually, but he would not submit to any operative proceeding. The separation of the upper from the lower teeth—the result of pressure by the enlarged tongue—was very remarkable, and not only interfered with his articulation, but also prevented him from biting his food. This, perhaps, to a Hindoo who lives chiefly on rice, was of comparatively little importance, and he seemed quite contented that it should remain in condition. Pressure exercised for some time had not produced that the least change, and it is doubtful if it ever would have done so at his age. Had it been applied in infancy, the result might have been different. The upper were separated from the lower incisor teeth by an interval of nearly an inch when he left the hospital.

A Bengali Brahmin, named Bejoy Chund, aged 20 years, was admitted into hospital on the 20th of August, 1866, with hypertrophy of the tongue. The organ was enlarged not protruding beyond the lips, but the mouth could not be

closed as the jaws were separated, and the lower teeth everted by the pressure. He was a healthy-looking young man in all other respects.

He states that about ten years ago he had a severe attack of fever, and immediately after it the tongue began to swell; it rapidly increased until it protruded from the mouth. He applied for treatment, at a neighbouring dispensary and the swelling subsided, but the amendment was only temporary; for in another month it again began to increase in size, and from that time it has remained much in its present condition; occasionally subsiding a little, and again increasing with symptoms of inflammation. He says that he never had syphilis and never took mercury; indeed, he is a remarkably healthy-looking person. The lower jaw is pushed downwards, and the upper and lower teeth are separated by an interval of nearly an inch. The tongue is much enlarged, round, and not compressed; it has several patches of enlarged papillary growth, not unlike the commencement of epithelioma; it is increased in length about two inches, smooth, red, and cylindrical towards its apex. A portion of the enlarged papillary growth, having been snipped off and examined under the microscope, showed only fibrous structure. The tongue is slightly painful on pressure, but it is the inconvenience, rather than the pain, that he complains of. He has difficulty in masticating, and his speech is much affected. Some slight increase of the growth has brought him to Calcutta to see if there be any remedy.

August 25th.—I bandaged the tongue with a small roller, having first applied a solution of Sulphate of Copper and prescribed *five* grains of Iodide of Potassium, three times a day.

26th.—The tongue is somewhat smaller. Continue the bandage and medicine.

28th.—The tongue is considerably reduced in size by the pressure. Continue the bandage, and the Potas: Iodid. I also applied pressure to the jaw, by a bandage round the head, with the view of remedying the distortion of the bone.

September 10th.—The tongue is diminishing, but not so rapidly as it did at first. It is now retained easily in the mouth, and his speech is more articulate.

There is no change in the jaw.

October 2nd.—The Tongue nearly reduced to the natural dimensions, and the hypertrophied papillæ have almost disappeared, but there is no improvement in the position of the jaw. He left the hospital on the 12th of October; the tongue nearly natural in size, and his speech much improved, but the distortion of the lower jaw remains, and I fear is permanent.

The distance between the upper and lower incisors, when the molar teeth are in apposition, is nearly an inch.

RADICAL CURE OF HERNIA..

No. XXXV.

IN continuation of former reports on the subject, I have to note the occurrence of the following cases of inguinal hernia, which have been treated by the insertion of a wooden plug into the inguinal canal:

I am satisfied that this operation, if carefully performed in favourable cases, will meet with a very fair amount of success, and I would strongly urge the necessity of paying great attention to details in ensuring the perfect invagination of the scrotum into the canal, so that the needle in perforating its apex may traverse the abdominal wall close to the internal ring. For it is on the changes that take place in this situation that success depends. In the *post mortem* examination of the body of the French sailor, who died from an accident sometime after a successful operation, it was very clearly demonstrated that the internal ring may be altogether closed, and that thus an absolute and permanent cure may be effected. To ensure this it is essential that the needle should perforate near the inner ring, and that the inflammatory products should be formed there.

I do not think that great danger necessarily follows, even though the peritoneum, within the abdominal cavity, should be punctured. The epigastric artery is hardly likely to be injured, as it lies beneath the parts that should be perforated.

In two of the following cases certainly, and probably in others, the peritoneum within the abdomen was wounded, and no peritonitis resulted. One, the case of an English sailor, recovered. The second—the only death that has yet occurred, took place from pyæmia which followed an attack of erysipelas. In this case the peritoneum had been punctured, but there was no inflammation whatever within the abdominal cavity; death being caused by blood poisoning from the erysipelas.

I am also satisfied that the invagination itself has little if anything to say to the success of the operation. In some cases that succeeded perfectly, it came down, whilst in others it remained in the canal. The secret of success in cases where the hernia is tolerably recent—for in these only, I believe, will it quite succeed—is to ensure the complete invagination of the integument, and thus the passage of the needle through the abdominal wall, close to the inner ring. Where the hernia is old, the rings large and both are dragged into close apposition the operation is not likely to do more than limit the size of the aperture, and render the hernia more controllable by aid of a truss. In such cases it is necessary to be cautious in passing the needle through the abdominal wall, that it is not pushed beyond the inner ring and the peritoneum wounded; for though this may happen without any ill effect, we cannot regard a punctured wound and a ligature in the peritoneum as other than a serious accident. It is necessary too that the plug should be kept in, until there is free suppuration about the ligatures, and care must be taken, during the after treatment, that proper support is applied over the inguinal canal, and that the patient is prevented from all efforts at straining or other muscular exertion, until the wound in the abdominal wall is cicatrized.

I have recently operated on two cases of inguinal hernia by another method—that recommended by an American Surgeon, Dr. Chisholm. The operation is very simple, and its success is dependent on the assumption that metallic wires will lie quiescent in the tissues, without causing suppuration. The operation was performed as follows:—The integument of the scrotum was invaginated with the finger into the inguinal canal. A curved needle with its eye near the point was then introduced on the finger into the canal, and made to perforate the internal pillar. It was then threaded with a silver wire, and withdrawn sufficiently to enable me to pass the point through the external pillar. The point of the needle was made to emerge through the same opening in the integument, by dragging the skin over the point of the needle. The loop of wire was then tightened, traction being made on the scrotum, so as to draw it down leaving only scrotal fascia invaginated, and thus the pillars of the ring were drawn together. The wire being twisted was cut short off, and allowed to retire within the puncture.

This had the effect in both cases of restraining the hernia; in one case only temporarily, in the other apparently permanently; but instead of remaining quiescent and free from irritation in each case, most profuse suppuration was excited, which continued for days, and much exhausted the patients. In one case, the hernia came down, and the patient was operated on with the plug. In the other, it induced a large amount of exudation, and thus apparently closed the opening. But in neither case did the operation succeed, as contemplated by Dr. Chisholm, and there can be no greater fallacy than to suppose that wires will not induce suppuration.

CASES.

1. D. L.,—aged 35, Maltese sailor, admitted on 26th May, 1865, with reducible inguinal hernia of right side. The operation was performed on the 2nd June, 1865, and he was discharged cured 24th July. He was previously tested in the usual way.

2. Baruk Sing, a Hindoo, aged 50, admitted on the 12th July, 1865, with incarcerated inguinal hernia, which was reduced with some difficulty. The patient was old and weak. The scrotum thickened. He was operated on, on the 18th July, and discharged, apparently cured on the 20th August.

3. Nujeeboolah, aged 32 years, Mahomedan Khalassie, was admitted 15th September, 1865, with inguinal hernia of right side. The operation was performed 20th September, and he was discharged, cured, on 18th October. The hernia, in this case, was of five years' duration, the ring large, admitting two fingers with ease; it was caused by lifting a heavy weight.

The invagination partly came down after the operation, but the hernia did not descend.

4. Soroop Condoo, a Hindoo cooly, aged 40 years, admitted 11th October, with inguinal hernia of the left side. The protrusion was very large, and was of many years' duration. The ring admitted three fingers. The operation was performed on the 16th October. Plug removed 20th October. There was slight peritonitis in this case. The operation was unsuccessful, for both invagination and hernia came down. He was discharged on the 6th November, 1865.

5. Dinoo, a Hindoo cooly, aged 40, admitted on the 22nd October, 1865, with hernia of the right side. Operation performed on the 26th October, discharged cured 19th November. The hernia was recent, and of moderate size, the ring admitting only one finger.

6. G. B.—an English clerk, aged 33 years, admitted 30th October, 1865. Operation performed on the 16th November. Discharged relieved, 27th January, 1866.

He was admitted with hernia in a state of incarceration; it was reduced. He subsequently had an attack of dysentery, from which having recovered, the operation was performed. The hernia was large, and though not cured, it was rendered manageable with a truss.

7. J. B.—aged 20 years, French sailor, admitted on the 28th December, with reducible inguinal hernia of the right side. Operation performed, on the 1st January, 1866. Plug removed, on the 4th January. Discharged cured, on the 21st January, after being put to the severest tests—such as climbing up a pole, carrying heavy weights. In this case, the hernia was quite recent, caused by muscular exertion, and the inguinal ring admitted one finger. The integument remained invaginated. He was re-admitted three months later for an injury of his head, and a dislocation of the femur, caused by falling, when intoxicated, from the roof of a house. He died of those injuries, and on examination the internal abdominal ring was found to be completely closed by firmly organized connective tissue. Death was caused by extravasation of blood into the brain substance, and diffused suppurative cellulitis of the injured limb. The *post mortem* appearances have been more fully detailed in a previous notice of the case.

8. Gopaul, aged 34, a Hindoo Bhisty, admitted, on the 5th January, 1866, with a large inguinal hernia of the left side. It had been mistaken for hydrocele. The hernia was reduced with some difficulty, and the operation was performed on the morning of the 6th January. The plug was removed on the 8th January. In this case, the invaginated scrotum partly sloughed. The ring was very large, and the hernia recurred after the wounds had healed, but it was less in size, and much more manageable with a truss. He was re-admitted two months later with the hernia strangulated at the internal ring; was operated on for the strangulation, and, recovering, was discharged, on the 16th March. He did not return after this.

9. Derajut Oolah, aged 45, Mahomedan Peasant, admitted on the 8th January, with a small inguinal hernia of the right side. The ring admitted one finger. Operation performed on the 14th January. Plug removed on the 17th January. Discharged cured on the 14th February. He was fairly tested before discharge.

10. Nazir, aged 35, Mahomedan Butcher, admitted on the 20th April, 1866, with strangulated inguinal hernia of right side. The stricture was divided, and he recovered. The wound having healed, the plug was introduced on the 10th May, and removed on the 13th May. He was discharged cured on the 1st of June. In this case the hernia was of seven years' duration, and the ring was large enough to admit one finger. The invaginated scrotum remained *in situ*.

11. Bashoolah, Hindoo, aged 28 years, admitted on the 17th June, 1866, with strangulated inguinal hernia of right side. The structure, at the internal ring, was divided on admission. The wound having healed, the plug was introduced on the 2nd July, and removed on the 5th of July. He was discharged cured on the 19th of July.

In this case the hernia was of five years' duration. The ring was clear and well defined, and admitted two fingers. The invaginated scrotum came down, but the hernia did not protrude; he was tested before being discharged.

12. C. R.,—aged 23 years, East Indian, admitted 17th July, with a small hernia of the left side. The ring admitted one finger with difficulty. Operation performed on the 22nd July. Plug removed 24th July. Discharged 14th August. In this case the hernia was of two years' duration. Before being discharged he was tested by climbing a pole, carrying weights.

13. L. D.,—aged 32, an English engineer, admitted 8th August. Had been operated on twice before in 1859 for hernia of the left side by Wüترز' method. The second of these operations proved successful, and he was discharged cured—wore a truss for six months. The hernia did not recur for four years, when it was brought down by an injury caused

by his being thrown against the pommel of a saddle, in Australia.

He progressed favourably after the third operation. On the 6th of August, 1866, he was tested, and appeared to be cured. A severe attack of dysentery supervened, and owing to the straining and weakness caused by this disease, the rupture recurred. On the 12th January, 1867, he was operated on for the fourth time. The plug was removed on the 15th January. The invagination came down, but the canal seemed to be closed by a mass of exudation. He was discharged cured, after being severely tested on the 15th February, 1867.

14. E. W. H.,—aged 35 years, Englishman, mate of a ship, admitted, 11th January, 1867, with inguinal hernia of right side, of about ten years' duration. The hernia was of moderate size, and the ring admitted one finger easily.

He was operated on, on the 11th January; plug removed on 14th January; and he was discharged on 7th February. As the needle perforated the abdominal wall in this case, some clear fluid escaped, and again on removing the plug a quantity of turbid serum followed it; about four ounces were collected. This showed that the opening communicated with the peritoneum. No symptoms of peritonitis occurred throughout the course of treatment, the wound cicatrized, and he was apparently quite cured when he left. He wrote to me from Ceylon some time after, and said that, notwithstanding all the work and exposure, the hernia had not returned.

15. W. B.,—aged 23, West Indian, steward of a ship, admitted 15th February with a bubonocoele on the right side, of one month's duration. Operation performed on 27th February according to Dr. Chisholm's plan; that of tying the pillars of the ring with silver wire. The wire was left, it excited very profuse suppuration; this subsided after some time, and the wound healed. He was discharged, apparently cured, on the 5th April. The canal obstructed by a mass of exudation. I doubt whether this will prove to be permanent.

16. Dwarka Nath, a Hindoo oilman, aged 28 years, admitted 22nd February with a large inguinal hernia of the

right side of five years' duration. The ring admitted two fingers easily. The operation was performed on the 25th February, by the same method as in the preceding case. Suppuration followed very freely. The wound healed, but the hernia subsequently descended. He was operated on with the plug in the usual manner on the 11th March, the plug was removed on the 14th March. In this case the plug ulcerated through the invagination, and the finger could, after the removal of the plug, be passed through the opening up to the internal abdominal ring, where a mass of exudation seemed to close the opening. He recovered and is still in the wards (10th April.) The hernia does not descend but from the impulse in coughing, I am doubtful as to the ultimate success of the operation. The results of these two operations with the wire do not incline me to repeat the proceeding. In neither case was success complete, and so far from suppuration not occurring it was more profuse, although silver wire was used, than in the cases operated on, with the plug and silk ligatures.

17. Ram Coomar, a Hindoo servant, aged 30, admitted on the 27th February with a very large inguinal hernia of the left side of eight years' duration. The ring admitted two fingers with ease. The operation was performed on the 5th March. The plug was removed on the 10th March, suppuration extended between the abdominal muscles, and erysipelas supervened in the cellular tissue of the thorax and axilla. Free incisions were made, and he was treated with Tr. Ferri. Sesquichlorid, nutrients, and wine. There was no peritonitis, nor any sign of abdominal mischief. He died with pyæmic symptoms on the 26th March, 1867. The lower lobes of both lungs were found to be consolidated,—one large pyæmic, (embolic) patch in the upper lobe of the right lung. Heart contained fibrinous clots in right cavities.

The operation had not succeeded; the inner ring was not closed. The inner and outer rings had in this case been dragged so close to each other, that in introducing the needle during the operation, it had passed beyond the inner ring and perforated the peritoneum. There was not, however, a trace of peritonitis. A coil of intestine which lay near the ring had contracted adhesions to the peritoneal surface. I suspected, during the operation, that the peritoneum was

punctured, as a quantity of serum escaped when the needle traversed the abdominal wall. Such was also the case in E. W. H's. operation, where the discharge of peritoneal fluid continued for some time. He perfectly recovered, and without any symptom of peritonitis.

18. Mr. C,—aged 43, slight but muscular and healthy, was operated on for reducible inguinal hernia of the right side on the 17th February. The hernia was not large, and the ring admitted one finger easily.

The plug was removed on the 21st February at 5 P.M., and on the 3rd March he was to all appearance perfectly cured. This is the most rapidly successful case I have known.

Operated, on February 17th.

Plug removed, February 21st.

Recovery, March 3rd.

Total 15 days.

19. M. G,—aged 42 years, an English seaman, admitted 4th March, 1867, with inguinal hernia of the right side, of four months' duration. The protrusion moderately large.

The operation was performed on the 13th March. Plug removed on the 16th March. Discharged on the 11th April. In this case there was cough after the operation, and the hernia recurred. The operation failed.

20 Moodosudhun, a Hindoo, aged 35 years, admitted on the 11th March, with inguinal hernia of the right side of five months' duration. The tumour was of moderate size, one finger entered the ring with ease. The operation was performed on the 16th March. Plug removed on the 18th March. He was discharged cured, after being tested, early in April.

The results of these operations are, on the whole, satisfactory, for out of the twenty, fourteen are returned as cured, and six relieved or failed. Fifteen cases were of the right side; five of the left. In two cases, strangulation had occurred,

and been removed by operation before the plug was introduced, and in one case death occurred from pyæmia caused by an attack of erysipelatous cellulitis.

I would again remark that the cases returned as "cured," were well tested before being discharged from hospital, and so recorded. Of the ultimate results I am unable to say much, as so few men return to tell us how they have been after the operation. I have recently seen a patient, employed on the railway, an Englishman, upon whom I operated four years ago, who continues perfectly well.

FIBRINOUS COAGULA IN THE RIGHT SIDE OF THE HEART.

No. XXXVI.

A Hindoo shop-keeper, named Indo Narain, aged 38 years, was admitted into hospital on the 27th March, 1867, suffering from a deep sinus running under the gluteal muscles. He gave the following history of his case:—About a year ago he had a bubo in each groin, that suppurated and was opened. The wounds were healing, when about two months later a swelling appeared in the lower part of the right gluteal region. This was opened, and a quantity of pus and blood evacuated. The sinuses in the groin healed, that in the gluteal region continued to discharge. Never had syphilis, but admitted having had gonorrhoea four years ago. Gave no explanation of the occurrence of the inguinal bubos. He was a sickly-looking man, but in tolerably fair condition. Seemed to be suffering much from the sinus which was situated at the lower margin of the right gluteal region, and through which a long probe passed for four or five inches under the Gluteus Maximus, away from the bowel, with which it seemed to have no connection. As pus appeared to lodge, and as the discharge was also profuse, and the end of the probe when pressed came so near the surface as to be felt beneath the skin, I made a counter opening, and to encourage the outward drainage of pus, drew a tape, to act as a seton, through the whole length of the sinus.

The following are the notes of the subsequent progress and termination of the case.

28th March.—He is feverish ; sinus inflamed.
Saline diaphoretic every three hours.

29th.—Still feverish ; bowels open ; tongue clean.
Saline as before.

30th.—No fever ; discharge tolerably free ; removed the seton. To have quinine. A pad and bandage over the sinus.

30th.—Fever again since noon yesterday, preceded by rigors.
Salines.

31st.—No fever to-day ; very little discharge. Crepitation as of emphysema felt in the gluteal region. Tongue moist ; pulse weak. Deep fluctuation below the great trochanter. An incision gave exit to some foetid pus and gas.

1st April.—Discharge still foetid and thin ; pulse weak and soft ; no appetite. Incision enlarged.

R. Decoct. Cinchon. ℥i.
Tinct. Cinchon. ℥i.
Ammon. Sesquicarb. gr. v.,
every four hours.

Brandy frequently and beef-tea.

Vespere. Pulse 108, feeble ; had fever during the day.

2nd.—Pulse 112, respiration 103 ; tongue moist and clean ; bowels open, complains of pain in the thigh of the affected side. It is swollen. Discharge from the opening of the same aspect as yesterday. Respiration hurried.

Continue all as yesterday.

11 A.M. Vomited frequently ; much depressed ; breathing hurried ; pulse feeble.

4 P.M. Is unconscious; respiration very rapid; cold sweats; pulse almost imperceptible.

Died shortly after.

Post mortem following morning. *Thorax.* Left lung much congested. Right lung contained a small tubercular cavity at its apex. No pyæmic patches. No pleuritic effusion. The right auricle and ventricle of the heart completely stuffed with firm fibrinous coagula, extending into the pulmonary arteries.

Left lobe of the *liver* much enlarged; its substance soft and fatty.

Spleen much enlarged; *kidneys* flabby and capsule easily detached.

The sinus was laid open; it ran under the *Glutens Maximus*, and had no communication with the bowel. The tissues in the neighbourhood were in a state of decomposition.

REMARKS.

THE fatal termination of a case of this kind, apparently so simple and unimportant, is well calculated to impress on one the fact that dangers of the gravest character may result from surgical operations and proves not only how important it is that everything connected with the hygienic condition in which the patient is placed should be duly considered, but that his individual peculiarities should also be studied. It has been truly said that, taking the average results of all operations into consideration, a patient who is placed on the operating table undergoes greater risk than that to which a soldier is exposed in the most sanguinary battle, and this probably rather understates, than exaggerates, the danger. The immediate perils are by far the least important, and the

mortality arising from them is infinitely less than that from the more remote and secondary accidents to which surgical patients are liable, and whose importance and influence on the death-rate after operations and accidents have been more and more studied and appreciated since Dr. N. Chevers, then a young physician of Guy's Hospital, drew attention to them twenty-five years ago. No subject, probably, has been more investigated of late years than this, and a vast amount of information has been collected, and light thrown on the subject, by German, French, and English pathologists.

The tendency, however, it appears to me, in the present day, is to attach too much importance to causes external to the individual, such as defects of hospital hygiene; and too little to individual peculiarity; though to deny the influence of the former or its due share in causing the mortality in question, would be to reject evidence that is simply incontrovertible. So far from undervaluing it, I regard the question of hospital construction as one of the greatest importance, and which, if neglected, must be attended with the worst results to surgical patients. But I am satisfied that, when all has been done, that science and experience can dictate as essential to the perfect construction of a hospital, or of a single ward, much still may remain in the patients themselves, that will go far to frustrate our best endeavours, and interfere with success; and that, do what we may to ensure their well-being, a certain class of blood diseases, resulting from changes in both the vascular and nervous systems, will, in a certain proportion of cases, still occur. That these will be less frequent, when the hygienic conditions, under which the patient has previously lived and is actually placed, are favourable, there can be no doubt; hence the urgent necessity of insisting on the most perfect

hospital accommodation that can be obtained. It is equally necessary that the condition of the individual should also be known, for on the integrity of his vital organs, not less than on the position in which he is placed, depends the issue of an operation.

Of the large group of pathological conditions by which death is caused after surgical operations and accidents, it would be interesting and profitable, for our future guidance, to ascertain, why one should prevail in a certain hospital or locality, whilst in another, perhaps apparently similarly situated, a different class set the surgeon's efforts at defiance; why, for example, in one hospital gangrene? in another erysipelas? in a third pyæmia should prevail? These conditions are, no doubt, closely allied to each other, and the discrimination might not be of any great practical importance, unless it enabled us to do away with the evil; but still any light thrown on the subject would be valuable, and might lead to a better appreciation of the real nature of ochletic disease.

I have in former communications adverted to the great mortality that exists in Calcutta hospitals, and especially in that of the Medical College, from blood poisoning after surgical proceedings and wounds, and I have called attention particularly to the great tendency to one form of disease by which this fatal toxæmic condition is engendered. I am unable to explain why it is that, although we may cut the soft parts with comparative impunity, the section of a bone is so frequently followed by purulent infiltration of its medulla, so that the slightest operation involving the division of bone is dreaded as a probable cause of pyæmia, but such unquestionably is the case. I am, indeed, inclined to believe that this osteo-myelitis is a more frequent pathological condition

than has been generally supposed, and that many deaths due to it have been, from the obscurity of the symptoms, attributed to other causes. The so-called pyæmia is no doubt the actual cause of death, in these cases of osteo-myelitis or pyelitis, just as it is in others where the septic condition has been engendered even when the bones have not been interfered with at all; it is only when the cause of the blood-poisoning is sought for by making a section of the bone after death or amputation, that it is discovered, should the condition of the medulla have been overlooked during life, as it may have been, owing to the bone being hidden in the enveloping soft parts.

But there is another pathological condition which is of frequent occurrence, and to which I am satisfied that, as an immediate cause, death, in a surgical patient, is frequently due. It is a frequent result of blood-poisoning, or of such pathological conditions as, from any cause, give rise to a state of hyperinosis. We are very familiar with it in many diseases, and it frequently is the last act in a series of changes that are incompatible with the continuance of life; but it is not only in conditions of extreme debility, exhaustion and toxæmia, that it occurs, it frequently supervenes before these conditions have been established, and of itself rapidly destroys life.

The formation of fibrinous coagula in the cavities of the heart, or in the great vessels, is the condition to which I allude, and more particularly to that form of it, which takes place in the right side of the heart. This is a condition which we know is liable to occur in the later stages of many diseases, and probably it is the actual cause of death in many, being itself due to the altered and hyperinotic condition of the blood; perhaps to some extent, to the diminished vitality of the tubes and cavities in which it circulates, and to altered

or defective nerve force. It is not only to its occurrence under these circumstances that I now allude, but to the fact that it is a danger to be apprehended after any severe,—indeed not always severe,—operation or injury, and may occur independently of those signs which indicate the toxæmic state of the blood we so frequently see in hospital patients in large cities, where not only are the hygienic conditions defective, but the people themselves are anæmic and wanting in vital energy. It is right, therefore, that this source of danger should be borne in mind, and that in any case where a tendency to exhaustion or anæmia exists, particular attention should be paid to the diet, and administration of such remedies as may tend to improve the spanæmic condition, which we may fairly assume to exist when these symptoms appear. In the preparation of patients for an operation, as well as in their treatment afterwards, it should be borne in mind that iron and nutrients should be freely given to improve the condition of the blood. Hypo-sulphites, according to Polli; Alkalies, according to Richardson and others; the former to limit the development of poison germs; the latter to obviate the tendency in the blood to clot. Above all, plenty of fresh air, to oxygenate the blood and tissues. Such no doubt are the measures of a therapeutic and dietetic nature, from which we may hope to derive benefit, and in these are implied not only proper aliment, but all favourable hygienic conditions. In many cases, the supervention of this embolic condition of the right side of the heart, is the precursor of speedy death, but not necessarily always so, and doubtless a certain amount of clotting, is frequently recovered from, or its effects are seen in a secondary form in the changes which occur in the lungs, as the result of the capillary embolism

to which its débris may give rise. In those cases where it proves fatal, the end is speedily brought about by the rapid and sudden withdrawal of blood from the pulmonic circulation, syncope, or cardiac apnea closing the scene. The earliest symptoms of weakness, failing pulse, coldness of the extremities, with rapid action of the heart, pallor, or lividity and hurried respiration, should receive due attention, and in some cases, I believe, that, provided no other changes have occurred in the viscera, as a result of septic absorption or embolism, the timely administration of remedies, such as I have indicated, may avert the danger and save life.

The case I have noted here is a sufficiently illustrative example of the conditions I have been describing. It is true, there were *post mortem* evidences of visceral changes of a chronic nature, but they were principally such as tend to induce the condition in which fibrinous clots are most likely to form, by interfering with the due elaboration and development of healthy blood: For if there be any one condition more than another unfavourable to the healthy development of blood, it is that disordered state of the blood-making organs so frequently found in this and all malarious countries. It is, I believe, only right that in estimating the respective value of the various causes by which life may be endangered or lost, after surgical operation, that we should take the malarious state of the climate, and its effects on the people into consideration; and, whilst we admit that much of the mortality may be due to intrinsic causes, we feel strongly, the more than ever paramount necessity of having hospitals to treat such people in that will, at least, place no obstacle in the way of their recovery.

FATTY DEGENERATION OF THE MUSCULAR FIBRE OF THE HEART.

No. XXXVII.

IN former communications I have described some of the causes of death which are due to pathological conditions, developed after surgical operations, and which are more or less influenced by certain circumstances external to the patient. I now wish to notice another pathological change, which is of great interest to the surgeon, and requires his attention in considering the question of operation upon certain individuals. The accompanying abstract fairly illustrates the symptoms, progress, and results, of a case in which the disease existed. There can be no doubt, I think, that when this degeneration in the structure of the muscular tissue of the heart has set in, and especially when it has made any progress, that the subject of it is much less capable of bearing the shock of an operation, and of rallying and effecting repair of the wound afterwards, than one who has the heart free from this fatty metamorphosis. I am not aware that there are any signs that can be pointed to as absolutely pathognomonic of the disease, no doubt in many cases it is sufficiently evident from changes going on elsewhere, which point to a general degeneration of all the tissues; but it may exist in men of advanced years, who have otherwise the appearance of robust health, and who only manifest the weakness which has insidiously crept on,

when any sudden or emergent demand is made on the vital energy, and the heart's action. Such Mr. Paget has said, "may be fit for all the ordinary events of calm and quiet life, but they are unable to resist the storm of a sickness, an accident, or an operation." (*Surg. Pathol.*, p. 98).

This pathological state is not a mere increase of the fat, which, to a certain extent, naturally exists about the heart; it is not simply a deposit of adipose matter in the connective tissue which lies between the muscular fibre, or connects the pericardium with the subjacent muscle, though it may be that this state of pinguescence may so far intrude on the muscular structure as to destroy it by the atrophy resulting from pressure. It is not, in short, a fat, but a fatty, heart that I now speak of,—a condition in which fat not merely displaces, but replaces muscle, and where a true metamorphosis may be said to have taken place. The natural appearance of the banded or striped muscular fibre is lost, and for it is substituted a granular deposit of oily or fatty matter. It is not my purpose to speak of the effects of the pathological change generally, nor of the various ways in which it may cause death, for, proceeding beyond a certain stage, fatal it must inevitably be; though, in a lesser degree, no doubt, it is often the cause of death in diseases, from which, under other circumstances, the patient might have recovered. My object is to direct attention to it as a cause of failure in surgical operations, and the obvious necessity, therefore, of endeavouring to ascertain its presence by any sign, and, if possible, so to improve the condition of the patient, as to enable him to support what he has to undergo, or, if needs be, to warrant the surgeon in altogether declining an operation, that, under the circumstances, incurs too great a risk of life, or offers too little prospect of success to be justifiable. Among the

numerous points to be considered in deciding the question of a surgical operation, none is of more importance than the subject now under consideration, and attention should be carefully directed to the subject in all cases, where it appears probable that this degeneration may be going on.

As I have already remarked, in some persons there is enough in their general condition to make us suspect the presence of this degeneration of the heart's muscular fibre. The wasted flabby muscles, the arcus senilis, grey-hair and general debility, with a feeble, perhaps slow and irregular pulse, hurried respiration, and weak heart sounds—all significantly suggest the changes that are going on.

But there are cases in which, notwithstanding the absence of these indications, the heart may be the subject of fatty degeneration, and though quite equal to the ordinary emergencies of life, yet be unfitted for the strain thrown upon it by a surgical operation or severe wound.

I am not aware of any symptom by which we can certainly diagnose such cases, and it is only by watching and carefully noting the state of the patient, both before and after the operation, that we can arrive at his real condition. In persons advanced in life, with a tendency to adipose deposits generally, though otherwise hale and robust in appearance; with a pulse perhaps rather slower than usual, for the period of life (say 50 to 60 years of age) occasional vertigo, perhaps, a fainting fit after some slight exertion, or change in the weather; a general want of tone; loss of appetite and spirits with imperfect sleep at night, and a feeling of dyspnoea or malaise about the thorax, our suspicions are aroused. Such are the indications that would call our attention to the heart's action, direct our observation to its rhythm and

sounds, especially to that of its diastole, and make us postpone any impending surgical proceeding, such as the removal of a calculus, or the ablation of a tumour; or would warn us not to interfere at all in a case, where the operation was not one of necessity or for the preservation of life. It would also indicate the necessity for an invigorating diet, and the administration of tonic and strengthening remedies, by which, not only tone might be imparted to the impaired muscular fibre, but force to the nervous energy. It would warn us to be more than usually careful in the administration of chloroform, and to save loss of blood or protracted shock during an operation as much as possible. It would also add to our anxiety after the operation, and make us less hopeful of a successful result; it would urge the necessity for the most watchful care, when any symptom of exhaustion or debility gave rise to the inference that the weakened heart was beginning to fail under its extra labour; and it would insist on the necessity for support of every kind.

CASE.

Ram-pershad, aged about 60 years, a Hindoo sweeper, from Oude, but many years resident in Bengal, was admitted on the 15th February, 1867, into the Medical College Hospital, for the treatment of elephantiasis of the scrotum, from which, he stated, that he had been suffering for the last ten years. It began with an attack of fever in Calcutta, the scrotum enlarging and becoming painful. This state of things recurred at periods of three months during the first seven years, the fever and swelling lasting for a day or two, then subsiding, but each attack leaving the scrotum somewhat larger than before. During the last three years, its growth has been more rapid, and the recurrences of fever more frequent; but for the last four months he has had no fever, and hearing of the removal of tumours of this nature, he came to submit to

surgical treatment. He was a fine stout healthy man, looking about sixty years of age, with white hair, general good health, no fever, pulse moderately good; heart's sounds natural in rhythm, but not heard very distinctly beneath the layer of adipose tissue covering the thorax. Had a large scrotal tumour, reaching nearly to the knees, which appeared solid and heavy.

Urine examined; no albumen. Sp. gr. 1020.

He was placed on a mild and nutritive diet on admission, and watched for five days.

On the 20th February, the tumour was removed in the usual way, by a vertical incision made down to the penis, through which that organ was detached from the mass, and held upwards; a second and third over the cords, by which each testis and cord were similarly reflected, and then a series of circular sweeps with the scalpel, to detach the tumour from the perineum. Twenty-six bleeding points were ligatured. The testes were healthy, and there was very little blood lost—eight ounces at the most. He bore the operation, the cutting part of which lasted about one hundred and fifty seconds, and the ligaturing of the vessels about five or six minutes, well; his pulse was fair when removed from the table. Under chloroform, he did not feel the operation. He had an opiate directly after, and was ordered milk and sago with some brandy. Like most men of his caste, he was accustomed to stimulants, though not in excess, and animal food.

6 P. M.—When warm in bed, thirteen more ligatures had to be applied as he lost a little blood from fresh bleeding. After this he vomited several times and felt weak.

21st.—Better; no more bleeding; tongue moist; vomiting ceased; bowels confined.

Continue a nutritive diet.

22nd.—No hæmorrhage; did not sleep well; takes his food poorly; bowels acted once.

23rd.—Bowels acted; pulse rather better; some appetite.

6 P.M.—Pulse feeble, 120 ; no fever. Bowels slightly loose ; tongue moist ; has hiccup ; stimulants ; mustard poultice to epigastrium ; astringents for the diarrhoea.

It is not necessary to detail the daily progress. He gradually became weaker, never thoroughly rallied, and had occasional hiccup ; diarrhoea—sickness—weak and irregular pulse, and depressed appearance, and dyspnoea. Towards the end rapid breathing with a feeble pulse, and very weak heart sounds, supervened ; the breath sounds being on the whole natural. He had no pyrexia, indeed the temperature was rather below the natural standard. At times he rallied so far as to make us think he would recover : all the time the wound looked well, and before his death considerable progress towards repair had been made. On the 23d March, after some hours of hurried respiration, with cold skin and rapid pulse, the thorax being resonant and the breath sounds natural, he died.

On examination of the body we found that there were large deposits of fat generally, and the heart was very fatty and flabby. The muscular fibre under the microscope presented a granular oily appearance, the natural structure being almost altogether absent. The wall of the right ventricle was unusually thin.

In the right ventricle was a firm white fibrinous clot, which extended far into the ramifications of the pulmonary artery. The formation of this clot was, no doubt, the immediate cause of death.

In this case the heart though equal to the ordinary emergencies of life, enabling the patient to maintain a stout and vigorous, though somewhat obese state of body, was unequal to the call made upon it after the operation. It gradually failed, and the supervention of a variety of signs of exhaustion indicated its inability to maintain a vigorous circulation, such as was needed under the circumstances to enable the patient to rally from the shock and effect repair. It continued to fail until finally cardiac embolism precipitated the fatal event.

FRACTURE OF THE RIBS WITH INJURY OF THE CONTENTS OF THE THORAX.

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No. XXXVIII.  
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THE group of cases, short notes of each of which, by my House Surgeon, Baboo Gopal Chunder Roy, are appended, is of considerable clinical interest, illustrating some prominent symptoms of injury of the contents of the thorax emphysema, hæmoptysis, pneumo-thorax, and collapse, or congestion of the lung. Four of the five cases recovered, the fifth terminated fatally. The treatment was of the simplest character, amounting to little more than placing the parts in a state of physiological rest. In one favourable, and in one fatal case, venesection was practised, and although only one recovered, yet there is no doubt it was of benefit in both, for it gave relief, if it did no more. I need hardly say that blood was not taken with a view of directly influencing the inflammatory symptoms which naturally might be expected to result from so severe an injury to the lung: for that purpose I would not, necessarily, have abstracted a drop of what could so ill be spared. It was a choice of evils, and was adopted for the purpose chiefly of relieving dyspnoea and the embarrassed state of the pulmonary circulation in the congested, but otherwise sound and uninjured, lung. In both cases it afforded relief, and in the first, I believe, it saved the patient's life, for when it was performed not only the pulmonic, but the systemic circulation was much embarrassed; the livid tint of the

skin and lips, and great prostration showing that such was the case. It was therefore, that I chose the least of two evils,—the debility likely to arise from the loss of a certain amount of blood, to avoid the greater evil of suffocation; and I have no doubt that the practice is likely to be satisfactory in result, as I believe it to be correct in theory. I think that instances are not rare where the judicious removal of a certain amount of blood, though in itself, in the abstract, an evil, may be productive of good, by relieving venous engorgement, and thus communicating activity to the overburdened and labouring circulation. It will not be understood from what I now say, that, as a principle, I advocate the general abstraction of blood in inflammation; I hold no such theory, the cases in which I advocate its use are not all inflammatory, and the object is rather of a mechanical, than of a vital nature. No doubt the reaction against venesection has been over-vigorous, and it is very possible that, in some cases, the abstraction of a certain amount of blood from the general circulation may be useful; but such cases are probably rare, the exception now, as they were considered to be the rule in former days. But if the loss of a small quantity of blood may be attended with beneficial effects, I think that we should not hesitate to avail ourselves of so potent a remedy, when its necessity appears to be indicated, simply because it is the loss of so much of the vital fluid. We are not so particular as to its results on other occasions; and though most capital, or protracted operations, or severe wounds are attended with the effusion of several ounces of blood, yet we do not particularly, perhaps not sufficiently, take the loss of blood into account in the subsequent condition and treatment of the patient, and I really believe that, as to a man in a fair ordinary state of health, the loss of a few ounces of blood is

not of any great or lasting importance ; we should not hesitate to take it if good appears likely to result. Therefore, whilst, as a general rule, I believe general bleeding to be unscientific and unnecessary in the treatment of inflammation, I am quite prepared to admit, that special conditions may arise of congestion or inflammation, in which it may not only be useful but necessary. In such cases stimulants and nutrients would probably be required and administered, even whilst the blood was flowing; such was the practice in the cases here recorded.

CASE I.

Fracture of the ribs ; Emphysema ; Pneumo-thorax ; Collapse of the injured lung. Injury caused by a fall from a tree.

Shekh Fyzoo, aged about fifty years, a Mahomedan coachman, admitted on the 25th March, 1866, having fallen from a height of about twenty feet to the ground. The left ribs from the third to the eighth inclusive, were fractured, the line of fracture extending downwards from the nipple. There was great depression from the injury, extensive emphysema of the thorax, neck, left arm, and abdomen. The left side of the chest was tympanitic on percussion; the pulse weak, and the breathing very difficult, but no hæmoptysis. Diffusible stimulants were ordered to be given frequently: hot bottles to the limbs and trunk. He was supported on pillows in the sitting posture, not being able to lie down.

26th.—Pulse still very feeble, skin cold, lips livid, dyspnoea severe, loud mucous râles with the respiration. Venesection 3 viii. from the right arm. The stimulants to be continued as before.

27th.—The pulse still feeble after the bleeding; but the breathing easier; temperature 99°. Large crepitation audible.

28th.—Rather better; pulse 128; respiration 36; easier; temperature 101°.

29th.—Pulse 100; respiration 36; temperature 102°; expectoration purulent. The air now enters the lung freely.

30th.—Much better; less cough and expectoration; emphysema disappearing; and strength returning. A simple cough mixture ordered containing.

Tr. Camph. Co.

2nd April.—Expectoration and cough much diminished; no pain; respiration clear on both sides. Continue medicine and diet. He gradually gained strength, and was discharged cured on the 19th April.

CASE II.

Fracture of ribs; Emphysema; Pneumo-thorax; Wound of the lung. Injury caused by a fall from aloft on board ship.

J. R ———, an English sailor, admitted 27th April, 1866. Fell, on board his ship, from a height of twenty feet, and fractured the fourth rib on the left side near its costal cartilage. There was much pain, dyspnoea and pneumothorax with considerable emphysema of the left side of the chest. There was no blood in the sputa. He progressed favourably, had no fever and only slight cough, which was modified by the use of the Tinct. Camphor. Co: He had a bandage round the thorax, and was kept at rest in bed with a nutritive, but unstimulating diet. The rib united, and emphysema disappeared; the breathing on both sides became natural, and he was discharged cured on the 17th May.

CASE III.

Fractured ribs; Emphysema; Pneumo-thorax; Wound of the lung. Injury caused by falling down stairs.

Bahadoor Khan, aged twenty-five years, a Mahomedan servant, admitted on the 18th April, with fracture of the anterior portion of one or two ribs on the upper part of

the right side; caused by falling downstairs. There was much pain and dyspnoea with emphysema of the right side of the thorax. No blood in the sputa. Percussion note about the seat of fracture was somewhat tympanitic, but respiration was audible in the affected lung; pulse feeble; slight cough. Bandage round the thorax; simple cough mixture; salines when feverish; moderate diet.

28th April.—Doing well; no cough; emphysema gone.

3rd May.—Ribs united; percussion note clear on both sides. Respiration natural.

12th.—Discharged cured.

CASE IV.

Fracture of ribs; Injury of lung; Pneumo-thorax; Emphysema.

Injury caused by compression of the chest between the buffers of two railway carriages.

Mahomed, aged fifty years, a Khalassie, admitted 23rd November, 1866, with fracture of three ribs, 4th, 5th, 6th, caused by pressure between the buffers of two railway carriages. There was extensive emphysema of the right side of the chest; great dyspnoea and bloody expectoration; pneumo-thorax on the right side.

25th.—Emphysema extended to the right side of the neck and face, as far as the eyelid. Respiratory murmurs faint; dyspnoea and bloody expectoration; Cough mixture; simple diet.

28th.—He is better; no fever; emphysema disappearing; breathing easy; cough less troublesome.

6th December.—No emphysema; slight cough; muco-purulent expectoration. Breathing nearly natural; bones united.

17th.—Discharged cured.

CASE V.

Fracture of ribs ; Laceration of lung ; Emphysema ; Death.
Injury caused by a kick from a horse.

Sibook-ram, aged fifty years, a Hindoo servant, admitted 1st April, 1867, with fracture of several ribs on the right side, caused by a kick from a horse. The axillary region depressed. The integument of the thorax neck and face distended by emphysema. Extremities cold ; pulse feeble ; respiration very painful and hurried ; no hemorrhage.

Respiration on the uninjured side is puerile and attended with mucous râles. He is much depressed.

Stimulants and warm fomentation ; rest in recumbent posture.

2nd April.—Pulse 96, feeble ; respiration 40 ; temperature 100° ; blood in the sputa. Emphysema extending ; noisy mucous râles ; cough troublesome.

3rd.—Pulse 128 ; respiration 28 ; temperature 104° ; emphysema still extending.

Saline and Stimulants.

4th.—Pulse 136 ; temperature 104°.

5th.—Dyspnoea worse and pulse feeble ; much congestion of the left lung, dulness all over right side ; the lung partially, if not altogether, consolidated. Took eight ounces from his arm ; he felt easier as the blood was flowing, but the improvement was only temporary, for on the following day he became worse. Again the breathing became very rapid ; pulse feeble ; and he died at midnight.

On *post mortem* examination the 2nd, 4th, and 5th ribs of the injured side were found to be broken about the middle ; one end of the 4th rib penetrated the lung ; the right lung was consolidated and adherent to the parietes ; the pleura much thickened ; the middle lobe was lacerated to the extent

of two inches; blood was effused into the thorax, the lung itself being engorged; the left lung was congested at the base.

This was a very severe injury; the shock was great, and the patient was an infirm man.

MEDICO-LEGAL NOTES.

NO. I.—RUPTURE OF SPLEEN:

BY

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THIS lesion almost constitutes a speciality of Medico-legal practice in India. The frequency of its occurrence, the disproportion between the amount of personal violence employed, and the gravity of the result; the difficulty of determining the degree of responsibility of the aggressor, and meting out punishment commensurate therewith, give the subject a greater importance than, judging from the scanty notices of it contained in Indian Medical periodicals, it has hitherto obtained.

*Does the spleen ever undergo spontaneous rupture from disease?*

*What is the exact condition of the organ which renders it liable to rupture?*

*Is mental emotion or its physical effects sufficient to rupture the spleen?*

*Is violence applied elsewhere than over the region of the organ sufficient to produce this effect?*

*Can rupture of the spleen be caused by an amount of violence not sufficiently severe to injure the surface or produce ecchymosis?*

*What part of the organ is most liable to rupture, and does rupture of different portions affect the rapidity or otherwise of the issue?*

*Do adhesions of the organ influence the occurrence in any way?*

*What circumstances—length, breadth, depth, &c.,—of the rupture itself would enable us to form an opinion of the rapidity of the occurrence of death?*

*What length of time usually intervenes between a rupture of the spleen and death, and what circumstances may modify the interval?*

*What amount of exertion is an individual capable of after rupture of the spleen has occurred?*

*Is the lesion necessarily fatal, and if not, how does nature endeavour to remedy it?*

*Can medical art be of any avail to ward off the fatal event?*

These are some of the principle heads of information still wanting in a precise and reliable form, ere we can intelligently appear in the witness box in any case of this sort.

This is one of those cases in which everything depends upon the medical testimony, and evidence in any particular case must be weak and unreliable in proportion to the want of information as to the general circumstances and law of similar occurrences. These can only be obtained from a minute record of every case. It is very improbable that one man's

experience, however extensive, can supply all the circumstances and modes of such an occurrence, and even were the accident more common in India than it is, it would still be incumbent on each observer to throw his experience into the mass of general information. With a hope that the following seven cases may throw some light on the subject, I detail them shortly, and add a few remarks with reference to the foregoing questions.

The first six occurred among thirty-three cases submitted by the police for *post mortem* examination during the year 1866, and the seventh happened under rather peculiar circumstances in the Jail Hospital.

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#### CASE No. I.

On the 14th of April, 1866, I examined the body of Dropo, aged about twelve years. The circumstances of her death were given in evidence as follows:—On the 11th of April, her husband on some slight provocation struck her three blows with his fist. This was deposed to by those witnesses who heard the sound of the blows, but they could not say when or how they were applied. Two females of the same house ran to her immediately; found her insensible and tried to give her some water to drink. She died instantly. The defendant admitted having struck one blow on her back. She had laboured under fever since the month of May.

*Post mortem examination.* Body much decomposed.

No bruise or other external indication of violence; though the decomposed state of the body may have masked this. Peritoneal cavity contained a large quantity of blood,—fluid and clotted. Spleen enlarged, soft and congested. Very dark in colour. Two tears were found on its concave surface—one leading upwards, and the other downwards from the hilum. There was also a horizontal rent along the hilum. The latter penetrated deeply into the substance of the spleen, the other two being shallower. There was no extravasation into the

abdominal walls over the spleen. Lungs pale and collapsed. Heart empty. Remaining organs apparently healthy, though much decomposed.

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#### CASE No. 2.

On the 29th July, 1866, the body of Poresh Money Chandelini was brought into the station for examination. The history of the death as disclosed in evidence at the Sessions' Court is as follows:—Her daughter, a girl of six or seven, was married to defendant, who used to cohabit with the deceased. During an absence from house, she became intimate with another man. This excited prisoner's jealousy. He used to beat her, he was seen striking her on the back with his fists on the morning of the 27th July, about 9 A.M., and about 12 noon of the same day she was found dead. It does not appear how long she lived, or whether she had had fever recently.

*Post mortem examination* 29th July, 8 A.M. Body well nourished, rather decomposed. Sanious fluid issuing out of mouth and nostrils. No wound nor discoloration on surface. Abdomen swollen; brain and membranes healthy. Lungs collapsed and anæmic. Cavities of heart contained no blood.

Peritoneal cavity contained a large quantity of blood, both fluid and clotted.

The spleen was found to be ruptured. A rent extended across its concave or visceral surface from the superior to the inferior border of the organ, nearer to the upper than the lower extremity.

It measured about  $\frac{1}{2}$ -in. wide and  $\frac{1}{2}$ -in. deep. The spleen measured  $7\frac{1}{2}$ -in. by 4-in. Its texture was soft and pulpy. The remaining abdominal organs were healthy.

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#### CASE No. 3.

On the 13th of October, 1866, I examined the body of Sobesta Bawa.

It appeared that on the morning of the 11th October, she and her mother-in-law quarrelled about the possession of a piece of bambóo. The latter is said to have caught her by the hair, thrown her on the ground, and struck her on the left side, she became insensible, and died almost immediately. She had been suffering from fever for some time previously, and was in a bad state of health.

The case was dismissed by the Deputy Magistrate on the ground that the evidence was contradictory, that the occurrence may have happened by accident.

*Post mortem examination* 13th October, 1866, 7 A.M. Body well nourished, but much decomposed. No wounds or bruises on surface. Brain membranes healthy.

Lungs anæmic; cavities of heart empty; abdominal walls contained no extravasated blood. Peritoneal cavity contained a large quantity of blood—fluid and clotted. The spleen was ruptured. The rupture was on the concave or visceral aspect. It extended from within an inch of the anterior border obliquely forwards and downwards to within an inch of the inferior border.

The spleen weighed  $4\frac{1}{2}$  lb., measured  $6\frac{1}{2}$ -in. by  $4\frac{1}{2}$ -in. It was extremely soft.

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#### CASE No. 4.

On the 19th of October, 1866, I examined the body of Beola Beebea.

Her death occurred under the following circumstances : On the forenoon of the 17th October, her husband, Kajem Shaik had come home from the fields, and not finding his dinner ready beat his wife severely. A severe blow on the right side was deposed to by witnesses, and deceased herself before her death confirmed that statement. She had received slaps and blows of the fist. She died shortly afterwards, having become weak and faint immediately after receiving the injuries. She had suffered from fever and enlargement of the spleen recently before death. Defendant was tried at



the Sessions Court, and sentenced to undergo six years' rigorous imprisonment.

A *Post mortem* examination was performed on the 19th October. She appeared to be fifteen years of age, and well nourished. There were bruises on both cheeks, but none elsewhere. The organs in this case were completely transposed from right to left. This transposition obtained in every detail of difference between the two sides. The spleen was situated in the right hypochondrium. It weighed  $10\frac{1}{2}$  chuttaks, measured  $7\frac{1}{2}$ -in. by 5-in., was engorged and pulpy; interior with a large blood clot; very little connective tissue apparent. The organ was ruptured. The rupture extended from the superior border ( $1\frac{1}{2}$ -in. from it) downwards and backwards to the inferior border, and for some distance along the hilum. It measured about 4-in. long by 1-in. broad. It was partially filled up with clotted blood. The amount of blood effused in the abdominal cavity was comparatively small. All other organs healthy.

### CASE No. 5.

On the 20th of October, 1866, the body of Monriuddi Shaik was brought into the station for examination. His death had occurred under the following circumstances: During the night preceding, the 10th October, he was caught cutting his way into a man's house for the purpose of theft or intrigue. The owner of the house at once secured him after a struggle, during which it is probable he underwent some rough usage. Fifteen to twenty neighbours collected, and he was tied, beat, slapped, and kicked with a view to force him to disclose the names of his accomplices, which he eventually did. In the morning, the chowkedar of the village came and took charge of him. He then underwent a second beating. He was now removed to the zemindar's Cutcherry, where the Naib observed that he was looking very ill and weak, and apparently suffering from the effects of his maltreatment. Thence he was conveyed to the thannah, where he became unable to walk. This was put down for shamming, and he was severely beat with sticks, and had chillies put into his eyes. He died very shortly thereafter.

*Post mortem examination.*—The body was much decomposed, but well nourished. Bruises were observed on the shins, and blood was found extravasated over the region of the spleen. The abdominal cavity contained a considerable quantity of blood, both fluid and clotted. The spleen, which was so friable that it could not be taken out whole, was found to be extensively torn. It could not be weighed nor measured. The lungs were exsanguine, and cavities of heart empty. Other organs decomposed, but apparently healthy.

These men were tried for the murder, but as it was not clear that they had inflicted the fatal injuries, they were found guilty of voluntarily causing grievous hurt, and sentenced to one year's rigorous imprisonment with 100 rupees fine, or in default fifteen months' imprisonment.

### CASE No. 6.

On the evening of the 29th October, 1866, I was suddenly summoned down to the jail at the request of the Magistrate to enquire into the cause of death of Ruthan Chamar, who had died suddenly between 4 and 5 P.M. that afternoon. An investigation was then and there held, and it appeared from the somewhat contradictory statements of witnesses, that the deceased had been struck violently on the back by *aqham-sair*. He immediately got faint and fell down. He was thought to be shamming, and received two stripes from a cane on the left side. The native doctor was summoned to see him, found him pulseless, ran for stimulants, but on his return found the man dead. Deceased had had fever, but did not apply for admission into hospital.

The *post mortem* examination revealed a rupture of the spleen. The organ weighed 8 chuttaks, measured  $8\frac{1}{4}$ -in. by  $4\frac{1}{4}$ . It was engorged but firm. The ruptures three in number—1,—3 inches from the anterior extremity, extending from the hilum to the lower border,  $1\frac{1}{2}$ -in. long,  $\frac{1}{2}$ -in. broad. 2,— $3\frac{1}{4}$ -in. posterior to the last, also extending from the hilum to the superior border,—2-in. long,  $\frac{1}{2}$ -in. broad. 3,—Occupied the anterior fourth of the hilum, was about 2-in. long by  $\frac{1}{2}$  broad, and deeper than the other two. The cavity of the peritoneum contained a large quantity of blood—

fluid and clotted. The surface was carefully incised all over the body, but no ecchymosis was observed. The cuticle was raised, and roughened along two lines on the left side of the body, but there was no ecchymosis, either beneath the skin or in the muscles of the abdominal walls. Lungs exsanguine; cavities of heart empty. Other organs healthy.

### CASE No. 7.

The following case which has features of singular interest occurred in the Jail Hospital.

Gānga Ram Mondle was admitted into hospital for intermittent fever on the 13th October, 1886. He had had an attack in jail about ten months previous to this. He was discharged on the 17th October. Fever lasted three days. His spleen was observed to be enlarged. He was treated with gentle laxatives and anti-periodics. Temperature varied from 96° to 100°. Was twice observed to be 94°. When he was admitted into hospital, he brought a piece of *neem* wood with him, with which he was in the habit of pressing his spleen, which he knew to be enlarged. This is not an uncommon practice among natives. He was again admitted on the 25th of October. It is not known whether he again resorted to the same practice, though it was strongly forbidden. There is no reason to think that he was struck or had sustained any injury. He was employed in light work. He came back complaining of great pain in the region of the spleen, and unable to stand erect. His countenance was anxious, pulse weak and rapid, skin hot, temperature high, and he was liable to distinct attacks of fever, coming on in the afternoon with shivering, and lasting five to seven hours.

He died on the 9th of December, forty-six days after admission. The history of the case received from daily notes is as follows:—He had regular quotidian attacks of fever up to the 13th day, again from the 19th to the 27th. On the 27th, 28th, 35th, and 36th days, attacks of fever were observed, but after that no distinct attack occurred. His temperature at first varied from 97° to 102°, but gradually fell, until, during the last ten days, it did not rise above 97°, and was observed as low as 92°. His pulse varied from 84 to 108. The abdominal pain continued unabated to the last. Bowels were

irregular; there was no diarrhoea nor constipation. His appetite was bad. On the 7th day oedema of both feet was observed, which subsequently increased and continued up to the end. Urine was passed frequently, was scanty and light in colour. On the 20th day, pain in the left chest and cough at night were observed. This cough continued. There were no physical signs. Treatment was mainly stimulant and nutrient. Biniodide of mercury was applied externally.

He died rather suddenly. He went to the cook house to eat his dinner, and after eating a small quantity, he fell down, was conveyed to his ward, and died in about half an hour.

A *post mortem* examination was performed on the 9th December at 8 A.M. Body exceedingly emaciated; no subcutaneous fat.

*Cranial cavity.* Scalp and skull healthy, dura-mater healthy; longitudinal lines contained no blood; a considerable amount of serum in the cavity of the arachnoid and beneath the membranes. Pia-mater somewhat congested. No atheroma nor embolism; arachnoidean villi enormous and large. Substance of brain healthy.

*Thoracic Cavity.* Slight pleuritic adhesions at base on right side. On left side adhesions more firm and extensive. A patch at the base very intimately connected with the diaphragm; so that the membranes were thoroughly glued together. A slight amount of consolidation had taken place at this locality. Right lung congested throughout, more so at base; left lung in a similar condition. Pericardium contained a small amount of coffee-colored fluid with floccules of lymph in it. White spot on surface of right ventricle. A very small decolorised clot in that cavity, with a considerable amount of dark fluid blood. Left cavities empty; walls and valves healthy. Trachea and larynx healthy.

*Abdominal cavity.* On opening the abdominal cavity, the peritoneum was found to be in a state of general inflammation. It contained a large quantity of coffee-colored fluid, and all the abdominal viscera were glued together. On separating them, they were found to be covered with

a thick layer of inflammatory lymph of a fawn color, which formed the medium of adhesion. It covered all the exposed surfaces of the membrane, and floated in the form of blocks in the peritoneal fluid. The small intestine could be separated and removed with tolerable facility, but in the left hypochondrium the adhesion was so firm, that it could not easily be disrupted. On exerting forcible traction, a portion of the ileum, about one foot from its termination, was found to be very intimately adherent to the lower portion of the spleen and the margin of the omentum, and on effecting a separation, a rent was caused which led into a cavity, which was situated in front and to the right of the spleen. This cavity extended up to the diaphragm, and was bounded by the spleen on the left side, its mesentery and the tail of the pancreas posteriorly; the diaphragm superiorly; the small extremity of the liver and the stomach anteriorly; and to the right and the left extremity of the transverse colon, the gastro-colic omentum, the great omentum, and the portion of ileum noted inferiorly. These organs and structures were firmly united to enclose this cavity, and separate it from the rest of the abdominal cavity. It contained a very large clot of blood weighing upwards of one ounce. The clot was firm and covered with a fawny exudation; the walls of the cavity were composed of the remains of the capsule of the spleen supplemented by the various structures noted. Internally it was covered with a soft layer of clayey lymph, and collapsed vessels were seen ramifying on the internal surface of it. The stomach contained a small quantity of semi-digested food. Mucous membrane healthy, thrown into close rugæ. External surface free anteriorly; great extremity united to phrenic portion, even the small end of the liver and the capsule of the spleen. Superior surface adherent to the concave surface of the liver, and inferior to the omentum and transverse colon.

*Duodenum* healthy. *Jejunum*. External surface inflamed; mucous membrane ruddy; ileum in the same condition; large intestine similarly affected. Intestines not contracted; caual continuous.

*Liver* adherent to the diaphragm, small intestine, and stomach; fatty and slightly cirrhotic lobules being more evident than normal.

*Spleen* much enlarged, measured 10 inches by 5. Closely adherent all over to surrounding structures. Adhesions more firm along superior border, and a line leading from each end of the hilum to the anterior and inferior margins. The surface included by these lines was devoid of capsule, and covered with a thin layer of lymph. On removing this, the substance of the spleen came into view. Organ firm, but excessively engorged. Sections gave acute angles. Capsule could not be distinguished separately beyond the margins of the uncovered cells, but was united with the other viscera, noted to form the boundary of the cyst which contained the clot. No other clots existed in the abdominal cavity. Spleen weighed  $9\frac{3}{4}$  chutlaks.

Kidneys slightly degenerated, contained a few cysts, pancreas healthy.

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### COMMENT.

Notwithstanding the admitted frequency of this occurrence and the loss of life which it occasions, the notice taken of it in periodicals and systematic works has hitherto been slight.

Taylor has a paragraph on the subject, quoting three cases, and laying down two propositions—1st, that the spleen may be ruptured by violence without the existence of any marks of injury; and 2nd, that when it is ruptured, the organ is most probably diseased. (*Manual*, 7th Ed., p. 362.)

I have not had access to the large work.

Beck in his well-known work does not allude to the subject.

Paris cites one case (p. 123) of rupture of the spleen, caused by violent kicks on the stomach.

Casper relates several cases of rupture of the healthy spleen. 1st; of a merchant who fell through a trap-door—a height of six feet—and sustained laceration of spleen with other severe injuries. He died instantaneously. (*Forensic Medicine*. Vol. I., p. 115.)

2nd, of a girl crushed by a waggon; who died twelve hours afterwards. The spleen was ruptured transversely. (*Op. Cit.* Vol. I., p. 253.)

3rd, of a man hit violently by the handle of a windlass; who died in a few minutes. His spleen and liver were both lacerated. (Vol. I., p. 256.)

4th, of a boy of five years who died in 5 hours after having been thrown down a few steps by another boy with all his force. His spleen was completely divided in two, and there was no ecchymosis externally. (Vol. I., p. 259.)

Morehead devotes a foot-note to the subject, quoting and relating a case. (*Researches on Disease in India*, p. 427, note.)

Chevers treats of the subject more minutely. (*Medical Jurisprudence for India*, p. 317—321.) He alludes to seven cases recorded in the Reports of the Nizamut Adawlut of Bengal; in four of which other injuries co-existed, and in the remaining three this was the only lesion. He cites two cases from his own practice of females, beaten by their husbands, in which fatal rupture of the spleen had occurred, and refers to sixteen cases recorded by other observers, among them, four by Mr. Heddle. (*Transac. of the Medical and Phys. Society of Bombay*. Vol. I., p. 304.) He quotes his conclusions that the subjects had resided in unhealthy places, had had fever shortly before the occurrence. That the cases occurred in the malarious months, and that the injury inflicted was slight. He also

notes cases in which a healthy or almost healthy spleen had been ruptured by violence. He adduces evidence in favour of "the spontaneous" rupture of the spleen, and records his opinion based on cases that death may occur immediately or after some days. He further hints at the probability that some persons recover from this lesion, adduces proof that portions of the spleen have been removed, and makes a suggestion in a foot-note that in cases, where the lesion is believed to have occurred, excision offers a chance of escape from death. Recorded cases of rupture of spleen are rare, and are not so detailed as to be of much service. Those of Mr. Haddle appear to be the best known and most usually quoted. An interesting case is recorded in the *Annals*, (No. XV.) by Mr. French, of a man who had a serious diarrhoea, and died in five hours after a rupture of the spleen. There was an indication of a former rupture in this case on the covered surface, and of incipient peritonitis. The subject had not had fever, but had resided in a very malarious locality.

There is a case alluded to by Dr. Beatson, in No. 4 of the *Indian Medical Gazette*, (p. 84,) but details are not given.

Dr. Wise relates a case (*Indian Annals of Medical Science*, April, 1866,) of recovery from presumed rupture of the spleen, which had been caused by a fall. This case compares instructively with my case No 7. Sir J. Y. Simpson writes a very interesting paper on those cases of fatal rupture of the spleen, which had occurred in the pregnant, parturient, and puerperal states, showing that the spleen is liable to be morbidly enlarged during pregnancy, and ruptured from slight causes. (*Edinburgh Medical Journal*, September, 1866). From all the evidence which I have been able to collect on



this subject, the following propositions may be stated with varying degrees of confidence:—

I. Rupture of the healthy spleen occasionally happens, but only from severe and direct injury. This fact is established by numerous cases. I remember seeing a young man who was admitted into the Edinburgh Infirmary in whom this, with other injuries, was caused by a waggon wheel passing over his abdomen. He lived several hours in a state of collapse, and his spleen was found completely divided in two.

II. When the spleen is diseased, comparatively slight violence may cause the lesion.

III. The occurrence of "spontaneous" rupture of the spleen is very doubtful, but in highly congested states of the organ, very slight causes, as muscular exertion, the shivering of the cold stage, &c., may occasion the rupture. (Chevers. *Op. Cit.*, p. 319, where several references are made). That the spleen, whatever its condition, can, from causes confined to the organ itself, undergo rupture, is highly problematical.

IV. When the condition of the ruptured spleen is detailed, it is generally stated to be enlarged, engorged, soft, or even pulpy. This appears from the Table of 13 cases which I append. Spleens enlarged from malaria may be roughly classed as follows:—

1. *Simple engorged spleen*—caused by a recent first attack, and accompanied by no hypertrophy, adhesions, &c. Thus spleen is soft, pulpy, like a large blood clot, and very friable, and apt to rupture. The liability to rupture is probably proportionate to size, and slight causes are sufficient to occasion the lesion.

2. *Hypertrophied engorged spleen*—caused by a recent attack of fever, the spleen having been formerly chronically enlarged, and its connective tissue increased in quantity. This spleen is firm and tense, not so friable as the last. It varies in size, and is also apt to rupture, but less so than the other requiring a greater degree of violence.

3. *Small hard spleen*.—The spleen of subjects, who have had repeated attacks of fever but none recently, the connective tissue of the spleen is hypertrophied. The organ contains comparatively little blood, its capsule is opacified, the subject of fibroid or even cartilaginous degeneration, and adhesions bind it to neighbouring organs.

4. *Large hard spleen*—presents the same features as the last on a larger scale.

It is the two first varieties which give rise to the cases under discussion. The weight may vary from 10 to 30 ounces or more, and the dimensions are increased to about 7-in. by 5, or more.

5. I know of no case in which mental emotion caused a rupture of the spleen, but I can conceive it quite possible.

6. Violence applied to any part of the body, is probably sufficient to rupture a highly friable spleen. But in the majority of cases there is evidence of direct blows having been administered to some part of the abdomen.

7. The spleen may be ruptured by an amount of violence, not sufficient to leave any marks on the abdominal walls or even on the person.

This proposition can be laid down as established by numerous cases.

8. The concave or visceral surface of the spleen is far more liable to rupture than any other part, and the ruptures are generally transverse. This probably results mainly from the shape of the organ, which is generally concave or plano-convex. Any impulse, direct or indirect, on the convex surface, must tend to put on the stretch and rupture the concave surface. The uniform support afforded to the parietal surface, and the less or more varying support to the visceral, must render the latter more liable to rent. Besides, in enlarged spleens, there are generally adhesions to the abdominal wall of the dorsal surface of the 11 cases, noted in all but one, the laceration was on the inner or concave surface. There is also reason to think that ruptures on the convex surface are not so rapidly fatal as the other variety.

9. Adhesions existing prior to the rupture, if they exist around the rupture, will probably tend to limit the extravasation, and so arrest the fatal issue.

10. The greater the size and *depth* of the rent, the more rapid has death probably been, and when several lesions exist, death must have been instantaneous. The amount of blood effused into the abdominal cavity, and the existence or otherwise of clot in the fissure, will also tend to direct or modify an opinion as to the rapidity of the fatal issue.

11. Death may occur in a few minutes or may happen after several days (Chevers.) In the latter case, however, it is probable that the secondary effects of the accident and not the lesion itself are the immediate cause of death. When death is caused by the rupture simply, it is probable that it is immediate or nearly so. This is true of the great

majority of cases, but shallow rupture limited by adhesion or on the convex surface, or the formation of blood clot in the rupture may be conditions of prolonged life.

12. In the great majority of cases, the individual is incapable of action, but persons have walked and gone up a stair after the occurrence of the rupture. The amount of exertion possible is probably dependent on the circumstances of the rupture.

13. The lesion is not necessarily fatal, but is so in the large majority of cases. Where recovery does take place, the following appear to be the steps of the process:—1. Coagulation of blood, preventing further effusion. 2. Peritonitis limited or general, producing local adhesions, and covering bare surfaces with lymph. 3. Absorption of the clot.

14. Of course in this as in every other case "prevention is better than cure," and the early and skilful treating of every case of fever would render the occurrence rare. The questions, however, which press on our notice here, are:—1st. Given a case of a ruptured spleen, can we by any means arrest the fatal issue? And 2nd: Given a case of enlarged spleen the subject of fibroid, and perhaps amyloid degenerations, can we do anything to reduce its size, diminish the risk of rupture, and arrest the train of cachectic symptoms which usher in death?

As to the first question—Dr. Chevers' suggestion to extirpate the organ, when circumstances strongly indicate the occurrence of the lesion, appears to me a good and feasible one, but I am not aware that it has hitherto been adopted in any case. Indeed, in most cases surgical assistance is not at hand, and the event is too urgent and rapid.

As to the second—when all medical means have been tried and failed, the question of excision remains, why should we not cut out a hypertrophied degenerated spleen on the same principle that we remove a diseased ovary? Two cases of this nature are recorded in England during 1866—one by Mr. Spencer Wells, reported in the *Medical Times and Gazette*; and another by Mr. Bryant in Guy's Hospital reports. I have unfortunately not been able to refer to the details of those cases; but the question of excision is well worthy of careful consideration, considering the number of deaths which are constantly occurring from the dyscrasia consequent on disease of this organ.

15. As to the purely legal aspect of the subject under discussion, though in strict law a man committing an illegal act is held responsible for all its consequences, still the reports of the Nizamut Adawlut, and the cases which have come under my own cognizance, show that the element of a diseased condition of the body of the murdered individual is always considered a mitigation of the offence.

I am inclined, however, to think that, considering the frequency of such cases, the number of lives sacrificed, and the fact that the most unprotected members of society are generally the victims, a more severe punishment ought to be allotted in such cases.

In fine, I would urge two practical conclusions from the foregoing.

1st.—That the greatest caution should be exercised in inflicting personal chastisement as a legal punishment; and,

2nd.—That in examining diseased spleens by palpation, the greatest gentleness should be employed.

## SUMMARY OF CASES.

| No. | Age. | Kind of injury sustained.               | Position observed.     | Time which elapsed between injury & death. | Amount of blood effused.   | Condition of spleen.          | Weight.      | Size.     | Situation and character of rupture.      | Observations. | Remarks.                                                          |
|-----|------|-----------------------------------------|------------------------|--------------------------------------------|----------------------------|-------------------------------|--------------|-----------|------------------------------------------|---------------|-------------------------------------------------------------------|
| 1   | P.   | Blow of fist.                           | None.                  | Died immediately.                          | Large.                     | Enlarged, soft, congested.    | .....        | .....     | 3 tears on concave surface.              | McLeod.       | Had suffered from recent fever. Died in April.                    |
| 2   | P.   | Blow of fist on back and back.          | None.                  | Died soon after injury.                    | Large.                     | Soft and pulpy.               | .....        | 7½ by 4   | A transverse rupture on concave surface. | Ditto.        | No history of fever. Died in July.                                |
| 3   | P.   | Thrust on the groin.                    | None.                  | Died immediately.                          | Large.                     | Extremely soft.               | 44 chuticals | 8½ by 4½  | Ditto.                                   | Ditto.        | Had recent fever. Died in October.                                |
| 4   | P.   | Blow of fist.                           | On the chest.          | Shortly after the healing of the wound.    | Small.                     | Extremely soft and congested. | 10½ "        | 7½ by 5   | Ditto.                                   | Ditto.        | Had recent fever. Spleen situated on right side. Died in October. |
| 5   | M.   | Very severe beating by fist and others. | Sides and over spleen. | A few hours.                               | Considerable.              | Extremely soft and friable.   | .....        | .....     | Several tears.                           | Ditto.        | Underwent then several hemorrhages. Died in October.              |
| 6   | M.   | Blow on back. One finger on left side.  | None.                  | Immediately.                               | Large.                     | Firm and engorged.            | 8 chuticals  | 8½ by 4½  | 3 rents on concave surface.              | Ditto.        | Had recent fever. Case occurred in October.                       |
| 7   | M.   | Thrust on left side.                    | None.                  | 44 days.                                   | A clot weighing one ounce. | Firm and engorged.            | 9½ "         | 10 " by 5 | Concave surface stripped.                | Ditto.        | Occurred in October, had recent fever.                            |
| 8   | M.   | Blow from a broken on abdomen.          | None.                  | 8 hours.                                   | Many points.               | Fish's and polypus.           | 14½ "        | 8½ by 5   | Rent on concave surface.                 | French.       | Occurred in March, no fever.                                      |
| 9   |      |                                         | None.                  | A few minutes. Walked a few steps.         |                            | Engorged, soft, pulpy.        | .....        | .....     | Transverse rupture on concave surface.   | Hodde.        |                                                                   |
| 10  | M.   | Fight with a little boy.                | None.                  | Ditto.                                     |                            | Soft and enlarged.            | .....        | .....     | No detail.                               | .....         |                                                                   |
| 11  |      | Boy and horse on chest and abdomen.     | None.                  | Ditto. Walked a little.                    |                            | 6 times larger than normal.   | .....        | .....     | Laceration on peritoneal surface.        | Ditto.        |                                                                   |
| 12  |      | Kick on belly.                          | None.                  | Ditto.                                     |                            | .....                         | .....        | .....     | .....                                    | Ditto.        |                                                                   |
| 13  | M.   | Striking at cricket.                    | None.                  | Went to an upper story. One day.           | 4 pints.                   | .....                         | .....        | .....     | Laceration on inner surface.             | Marshall.     |                                                                   |









# PHYSIOLOGICAL & THERAPEUTICAL. ABSORPTION BY THE HUMAN SKIN.

BY

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ABSORPTION by the Human Skin is a subject of considerable importance, whether we regard it from a physiological or a therapeutical point of view ; yet those writers who treat of it are not agreed among themselves as to whether the human skin does really absorb or not. On the affirmative side we find the following :—

Before the close of last century Abernethy and Falkner performed a series of experiments, the results of which led them to the conclusion, that substances in solution were absorbed by the skin.<sup>1</sup> Dr. Wm. Wood discusses the subject at length, and arrives at the same conclusion.<sup>2</sup> Braconnot states as the result of his observations that, after baths the urine was always increased in quantity, and that whether the water of the bath had been alkaline or acid, the urine

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1. Currie's *Medical Reports*, p. 205. *Liverpool*, 1798.

2. *Chapter on Absorption*, in his *Essay on the Structure and Functions of the Skin*. *Edinburgh*, 1832.

always became neutral.<sup>1</sup> Dr. Robley Dunglison, Professor of Materia Medica, University, Maryland, United States, writes thus:—"J. Bradner Stuart found after bathing in infusions of madder, rhubarb, and turmeric, that the urine was tinged with these substances;" and that "Thomas Sewall found the urine colored, after bathing the feet in infusions of madder, and the hands in infusions of madder and rhubarb."<sup>2</sup> Dr. Madden in his "Graduation Thesis" (University of Edinburgh, in 1837) gives the result of a series of experiments he tried chiefly on his own person. He stated that in nearly every case he obtained an increase of his weight after taking a bath, in one instance to the extent of five drachms. Having immersed his whole arm and forearm in a solution of iodide of potassium for an hour and a quarter on four successive days, he found traces of it on testing his urine. In experimenting on his own person with infusions of rhubarb, jalap, and gamboge, he produced purgative effects.<sup>3</sup> Müller, in his "Elements of Physiology" says,—“The skin covered with epidermis, however, is certainly endued with absorbing power; but substances to be absorbed must be either in solution or readily soluble in animal fluids.” “All metallic preparations rubbed into the skin, have the same action as when given internally, only in a less degree.”<sup>4</sup> Dr. Carpenter says—"It has been found that after bathing in infusions of madder, rhubarb, and turmeric, the urine was tinged with these substances.  
 . . . . . Many saline substances are absorbed by the skin when applied to it in solution."

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1. *Revue Medicale*, August, 1833, cited by Fardel sur les *Eaux Minerales*, p. 37. Paris, 1857.

2. *Human Physiology*, p. 68. Philadelphia, 1836.

3. *British and Foreign Medical Review*, p. 339, 1838.

4. Müller's *Elements of Physiology*, translated by Wm. Baly, M.D., p. 251. London, 1838.

5. *Carpenter's Physiology*, p. 518, 1846.

M. O. Henri states that iodide of potassium penetrates the skin during a bath consisting of a very weak solution of that substance. He is of opinion that those experimenters who have obtained negative results erred in employing too strong solutions.<sup>1</sup> Dr. W. S. Kirkes, also, is in favour of the affirmative side of the question, as the following extracts will show: "Metallic preparations rubbed into the skin have the same action as when given internally, only in a less degree. . . . . Vegetable matters also, if soluble, or already in solution, give rise to their peculiar effects, as cathartics, narcotics, and the like, when rubbed into the skin. . . . . When simply left in contact with the skin, substances, unless in a fluid state, are seldom absorbed."<sup>2</sup>

Durian, after a series of experiments, sums up the result in the three following propositions:—

"1st.—That water of a lower temperature than that of the body was absorbed."

"2nd.—That the urine was always alkaline after a bath, whether it was alkaline or acid".

"3rd.—That substances dissolved in a bath were never absorbed—at least, if they were, they could not be detected by any test now in use."<sup>3</sup>

MM. Chevallier and Petit "have proved from direct experiments, that one-half hour's immersion in Vichy water is sufficient to modify the fluids of the economy, and cause them to pass from the natural or acid state to the

1. *Essai sur l'Emploi Medical et Hygienique des Bains*. Paris, 1855.

2. Kirkes' *Hand-book of Physiology*, p. 355, 1856.

3. *Archives Generales De Medecine*, p. 161 tome 7. Paris, 1856.

alkaline."<sup>1</sup> Heidler refutes the conclusions arrived at by Lehmann of Leipzig, and maintains that saline solutions can reach the blood through the skin.<sup>2</sup> Westrumb after having bathed his forearm and foot in Prussiate of Potass, found distinct traces of it in the urine.<sup>3</sup> Dr. Willimin of Vichy tried a number of experiments in March 1863—on nine male adults—and the conclusion he arrived at was, that absorption had taken place, but that it differed in degree in different individuals under different circumstances.<sup>4</sup>

We come now to consider the authorities on the negative side of the question.

On this side we must be content to commence with Seguin, having failed to discover any earlier writer who adopts it. We find from the *Annales De Chimie*, tome XC. page 185, that Seguin tried a number of experiments both on his patients and himself. The baths consisted of various solutions including one of the salts of mercury, but in no case in which the skin was not injured, could he discover any trace of absorption (whether of air, water, or any substance dissolved in them) having taken place. Dr. Currie, of Liverpool, has given an account of some attempts he made to administer nourishment through the skin to a patient of his,—a gentleman,—who had the cardiac orifice of his stomach closed by a cancerous tumour. He had the patient's entire body bathed in warm milk, beef-tea, &c., &c., but failed in his object. There was no increase of weight after the baths,

1. Quoted by M. Herpin, *Etudes Medicales*, &c., pp. 185 and 186. Paris, 1856.

2. Quoted by M. Henri Dors (Vevay) *De l'Emploi de la Vase dans les Bains de mer de la Suede*, p. 44. Paris, 1861.

3. *Archives Generales de Medicine*, page 14, July, 1863.

4. *Archives Generales de Medicine*, July, August, and September, 1863.

and the patient eventually died from want of nourishment.<sup>1</sup> Joseph Klapp of Albany, New York, after trying a series of experiments, arrived at the conclusion that the human skin does not absorb. He gives it as his opinion that certain medicines produce their respective effects not through absorption, but "through the medium of sympathy."

Dr. N. Chapman, in his discourse on the *modus operandi* of medicines, writes as follows:—"Determined, if possible, to put this agitated question to rest, Dr. Rousseau, assisted by his friend Dr. Samuel B. Smith, has performed a series of experiments, many of which I witnessed, and therefore bear testimony to their accuracy, with every variety of substances, mild and acrid, volatile and fixed, nutritive, medicinal, and poisonous."

"The result of these extensive researches is"—

"1. That of all substances employed, madder and rhubarb are those only which affect the urine, the latter of the two the more readily enters the system. Neither of the articles can be traced in any other of the secretions or excretions, or in the serum of the blood."

"2. That the power of absorption is limited to a very small portion of the surface of the body. The only parts, indeed, which seem to possess it, are the spaces between the middle of the thigh and hip, and between the middle of the arm and shoulder. Topical bathing with a decoction of rhubarb or madder, poultices of these substances applied to the back or abdomen, or sides or shoulders, produced no

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<sup>1</sup> Currie's *Medical Reports*, p. 247. Liverpool, 1789.

<sup>2</sup> *Chemico-physiological Essay*, pp. 34 & 35. Philadelphia, 1805.

change in the urine, equally ineffectual was the immersion of the feet and hands in a bath of the same materials, which after being kept in it for several hours, not the slightest proof of absorption was afforded."

"As I have described, such is the state in which this interesting subject is at present left. Though perhaps not absolutely decided, enough surely has been done to demonstrate that cuticular absorption rarely happens, and that whenever it does, it cannot be deemed the effort of a natural function." <sup>1</sup>

Durand Fardel, writing in 1851 on the mineral waters of Vichy, says he does not believe in their absorption by the skin, and that they have no effect on the urine. <sup>2</sup> Lehmann of Leipzig, writing in 1855, states that he was not able to detect any trace of the saline substances which are contained in the mud baths of Marienbad, in the secretion of persons who had used them. Consequently, he infers that the skin does not absorb. <sup>3</sup> In 1855, Dr. V. Kletzensky of Vienna published an account of certain experiments he had tried. The results of which led him to conclude that the skin does not absorb. The following account of his mode of procedure is given by Dr. Murray Thomson, in his paper read before the Royal Society of Edinburgh, 1862: "His forearm and hand were carefully cleaned and washed, and then bathed in a solution containing a known weight of iodide of potassium.

"The baths were taken before breakfast, after active exercise, which produced sweating. Each bath lasted for two hours. After the bath, the following secretions were

<sup>1</sup> *Discourses on the Elements of Therapeutics and Materia Medica*, pp. 56 and 57, by N. Chapman, M.D. Philadelphia, 1817.

<sup>2</sup> *Des Eaux de Vichy*.

<sup>3</sup> Schmidt's *Jahrbucher*, Vol. VIII., p. 105.

examined for iodine. The tears, saliva, nasal mucus, urine, and the serum from a blister raised by cantharides for the purpose of the experiment. The tests used would have detected one-millionth of a grain of iodine, had such been present in any of the fluids examined, but in none was a positive indication obtained.

"To demonstrate further the non-absorption of the salt after each bath, the forearm and hand were well rinsed with distilled water; these washings were mixed with the water of the bath, and the whole evaporated to dryness. If absorption had taken place, the weight should now have been less than the weight of the iodide used; but instead of that it was greater. Dr. Kletzensky explains the increase to be owing to exosmosis of salts from the blood."

Homolle could detect no trace of iodine after baths of iodide of potassium or of cyanurets or hydrocyanic acid, after baths of ferrocyanide of potassium. <sup>1</sup> Braune could detect no iodine in the urine after foot baths of iodide of potassium and of iodine, when the evaporation of iodine and absorption through the lungs were prevented by a layer of oil on the water of the bath. <sup>2</sup>

There is an article on baths in the *British and Foreign Medical Review*, January, 1859. When treating of the Medical Bath the author states, it was his opinion that "the substances dissolved in the baths are not absorbed through the skin." The last authority I shall quote is Dr. Murray Thomson, lately Lecturer on Chemistry in Edinburgh, now Professor of Experimental Science, Thomason College,

<sup>1</sup> *British and Foreign Medico-Chirurgical Review*, p. 144, January, 1859.

<sup>2</sup> *British and Foreign Medico-Chirurgical Review*, p. 145, January, 1859.



Roorkee. In his paper on the absorbing powers of the human skin in the *Edinburgh Medical Journal*, 1862, he details certain experiments he had tried, and declares himself very decidedly in favour of the non-absorbing theory.

Finding from a perusal of the chief authorities on the subject, of which, in the foregoing pages, I have given an outline, that the question as to whether or not the human skin absorbs, was still in dispute, I deemed it one to which I might profitably turn my attention. With the view of arriving at some definite conclusion, I determined on trying a series of experiments. And being impressed with the idea that some of these writers had drawn a general conclusion from very inadequate premises, I determined to try the experiments, not only with different substances but on different individuals, and, so far as was practicable, under various circumstances. With this view, I requested three of my friends (A, B, and C) and a porter (F) to take certain of them. I likewise requested one of the nurses of the infirmary to collect and give me the urine of one of the patients (E). Having thus secured that the experiments should be tried on four adults (including myself D) in the prime of life, and two lads, I considered that I had laid a sufficiently broad basis to warrant a sound conclusion. My next endeavour was to obtain a sufficient number of substances of different kinds. Having secured twelve of these, I proceeded to use them in different forms, some in baths, both for the whole body and also only for the feet; others as applications to particular parts of the body. I also varied, so far as circumstances would permit, the temperature of the baths, and the quantities of the substances dissolved in them. I further arranged that the baths should be taken at different hours, both of the day and night; sometimes

after long fasting, at other times soon after a full meal. The quantity of the substances used was carefully weighed and dissolved. Care was taken to note the time the person was in the bath, also the temperature of the water, and, so far as was possible, the quantity of it employed. In the first twenty the whole body, except the head and neck, was immersed, and no precaution was taken to avoid inhaling the vapour.

The experiments and their results are exhibited in the annexed Table with reference to which it will be advanced.

(1.) That in those where iodide of potassium was the substance experimented on, no trace of iodine was detected either in the urine or the saliva.

(2.) That with regard to the effects of caustic soda, the urine of the persons who took these baths was acid or normal previous to taking the bath. In the case of B there is no doubt that the caustic soda was absorbed by the skin. With the view of placing the matter beyond doubt, I got him to try two additional experiments. The result proved that this reaction was not merely accidental, but that the absorbing power of his skin differed from that of C and D. These four experiments tried on him, have proved most satisfactorily the fact, that the skin does not possess this absorbing power at all times in a like degree. In No. XIII., he did not get an alkaline reaction till twenty-two and a half hours after the bath. In No. XV. he got the alkaline reaction as soon as ten minutes after the bath, then two hours afterwards, and not again till twenty-three and a quarter hours after it. In No. XIX., he got the alkaline reaction ten minutes after the bath, and then there was no return of it, though the urine was tested for thirty hours after the bath. In No. XX., he got

the alkaline reaction at seventeen and a half, and eighteen and a quarter hour after the bath, but it was very slight.

(3.) Of the experiments with Belladonna, it will be observed by reference to No. XXXI., that D's skin absorbed it. A kindly offered to try the experiment on himself, but only received a negative result, as is seen by No. XXXII. This I think is due to his having applied too small a quantity.

(4) As to Tar. This was the only other experiment in which I obtained a positive result. There can be no doubt that this substance was absorbed by the skin, as every precaution was taken to ensure a fair trial.

The conclusions to which these experiments lead me, are 1st.—That the human skin does possess the power of absorption; 2nd.—Which varies in degree, not only in different individuals, but in the same person, with time and circumstances.

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# EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

*Baths in which the whole body was immersed.*

| Number. | Subject. | Sex. | Age. | Date.            | Substance.                 | Quantity in Grams. | Quantity of water in gallons | Temperature of water. | Period of immersion. | Urine collected for hours. | Urine reduced by evaporation to. | Tests used.                                                                                                                                        | Result.                 |
|---------|----------|------|------|------------------|----------------------------|--------------------|------------------------------|-----------------------|----------------------|----------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1       | D.       | M.   | 23   | 19th Sept. 1883. | Ferrocyanide of Potassium. | 3000               | 50                           | 98°                   | 1 hour.              | 24                         | 4                                | Perchloride of Iron.                                                                                                                               | None could be detected. |
| 2       | D.       | M.   | 23   | 21st Sept. 1883. |                            | 4000               | 50                           | 98°                   | 1 h. 15 m.           | 24                         | 4                                |                                                                                                                                                    |                         |
| 3       | A.       | M.   | 26   | 21st Sept. 1883. |                            | 4000               | 50                           | 93°                   | 40 m.                | 24                         | 4                                |                                                                                                                                                    |                         |
| 4       | D.       | M.   | 23   | 28th Sept. 1883. |                            | 5000               | 75                           | 90°                   | 1 hour.              | 24                         | 4                                |                                                                                                                                                    |                         |
| 5       | E.       | M.   | 24   | 29th Sept. 1883. |                            | 6000               | 75                           | 95°                   | 1 hour.              | 24                         | 4                                |                                                                                                                                                    |                         |
| 6       | C.       | M.   | 17   | 2nd Oct. 1883.   |                            | 4000               | 60                           | 95°                   | 45 m.                | 24                         | 4                                |                                                                                                                                                    |                         |
| 7       | D.       | M.   | 23   | 13th Oct. 1883.  | Iodide of Potassium.       | 2000               | 75                           | 95°                   | 1 hour.              | 24                         | 15 near dryness.                 | Distilled with Binoxide of Manganese and Sulphuric Acid, received the distillate into alcohol and then tested with starch and chlorine for Iodine. | None could be detected. |
| 8       | E.       | M.   | 24   | 16th Oct. 1883.  |                            | 4000               | 75                           | 95°                   | 1 hour.              | 24                         | 24                               |                                                                                                                                                    |                         |
| 9       | E.       | M.   | 24   | 16th Oct. 1883.  |                            | 1800               | 70                           | 90°                   | 1 hour.              | 24                         | 24                               |                                                                                                                                                    |                         |
| 10      | D.       | M.   | 23   | 16th Oct. 1883.  |                            | 2000               | 60                           | 90°                   | 1 hour.              | 24                         | 24                               |                                                                                                                                                    |                         |
| 11      | C.       | M.   | 17   | 20th Oct. 1883.  |                            | 2000               | 80                           | 90°                   | 45 m.                | 24                         | 24                               |                                                                                                                                                    |                         |
| 12      | C.       | M.   | 17   | 23rd Oct. 1883.  |                            | 3000               | 80                           | 90°                   | 1 hour.              | 24                         | 24                               |                                                                                                                                                    |                         |

## EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

*Baths in which the whole body was immersed.*

| Number. | Subject. | Sex. | Age. | Date.           | Substance.    | Quantity in<br>Grams. | Quantity of<br>water in gallons. | Temperature<br>of water. | Period of Im-<br>mersion. | Urine collect-<br>ed for hours. | Urine reduced<br>by evaporation. | Tests used.                                                 | Results.                                                                                                                                                     |
|---------|----------|------|------|-----------------|---------------|-----------------------|----------------------------------|--------------------------|---------------------------|---------------------------------|----------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13      | B.       | M.   | 24   | 3rd Oct. 1893.  | Caustic Soda. | 2000                  | 75                               | 98°                      | 1 h.                      | 26                              | Not evaporated.                  | Tested with Turnesio paper as soon as the urine was voided. | Got a strong alkaline reaction 23½ hours after the bath, and again a feeble reaction 26½ hours after.                                                        |
| 14      | D.       | M.   | 23   | 3rd Oct. 1893.  |               | 3000                  | 65                               | 90°                      | 1 h.                      | 30                              |                                  |                                                             | Got no alkaline reaction.                                                                                                                                    |
| 15      | B.       | M.   | 24   | 5th Oct. 1893.  |               | 5000                  | 75                               | 98°                      | 1 h.                      | 40                              |                                  |                                                             | Alkaline reaction 10 minutes after the bath, very decided 2 h. after not so decided 23 and 26½ hours weakly so, very slightly so at 27½ and 30½ hours after. |
| 16      | D.       | M.   | 23   | 6th Oct. 1893.  |               | 4000                  | 70                               | 98°                      | 1 h.                      | 31                              |                                  |                                                             | No alkaline reaction.                                                                                                                                        |
| 17      | C.       | M.   | 17   | 11th Oct. 1893. |               | 2500                  | 80                               | 98°                      | 45 m.                     | 33                              |                                  |                                                             | Do. Do.                                                                                                                                                      |
| 18      | G.       | M.   | 17   | 14th Oct. 1893. |               | 4000                  | 80                               | 90°                      | 45 m.                     | 34                              |                                  |                                                             | Do.                                                                                                                                                          |
| 19      | B.       | M.   | 24   | 21st Oct. 1893. |               | 2000                  | 75                               | 98°                      | 1 h.                      | 30                              |                                  |                                                             | Urine voided 10 minutes after bath, decidedly alkaline, but no further reaction after.                                                                       |
| 20      | B.       | M.   | 24   | 23rd Oct. 1893. |               | 5000                  | 75                               | 98°                      | 1 h.                      | 36                              |                                  |                                                             | 17½ and 18½ hours after the bath, very slightly alkaline reaction. None before or after.                                                                     |

# EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

## Foot Baths.

| Number. | Subject. | Sex. | Age. | Date.           | Substance.      | Quantity in grains. | Quantity of water in gallons | Temperature of water. | Period of immersion. | Urine collected for hours. | Urine reduced by evaporation to. | Tests used.         | Results.  |
|---------|----------|------|------|-----------------|-----------------|---------------------|------------------------------|-----------------------|----------------------|----------------------------|----------------------------------|---------------------|-----------|
| 21      | L.       | M.   | 23   | 9th Nov. 1883.  | Turkey Rhubarb. | 980                 | 6                            | 90°                   | 1 h. 30 m.           | 13                         | Not evaporated at all.           | Color of the urine. | Negative. |
| 22      | R.       | M.   | 24   | 16th Nov. 1883. |                 | 980                 | 6                            | 90°                   | 2 h.                 | 13                         |                                  |                     |           |
| 23      | D.       | M.   | 23   | 17th Nov. 1883. |                 | 1920                | 6                            | 90°                   | 2 h.                 | 13                         |                                  |                     |           |
| 24      | D.       | M.   | 23   | 11th Nov. 1883. | Madder.         | 980                 | 6                            | 90°                   | 1 h. 30 m.           | 13                         | Not evaporated at all.           | Color of the urine. | Negative. |
| 25      | R.       | M.   | 24   | 23th Nov. 1883. |                 | 980                 | 6                            | 90°                   | 1 h. 15 m.           | 13                         |                                  |                     |           |
| 26      | D.       | M.   | 23   | 19th Nov. 1883. |                 | 1920                | 6                            | 90°                   | 2 h.                 | 13                         |                                  |                     |           |
| 27      | D.       | M.   | 23   | 14th Nov. 1883. | Turneric.       | 980                 | 6                            | 90°                   | 1 h. 30 m.           | 13                         | Not evaporated at all.           | Color of the urine. | Negative. |
| 28      | D.       | M.   | 23   | 21st Nov. 1883. |                 | 1920                | 6                            | 90°                   | 2 h.                 | 13                         |                                  |                     |           |

## EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

*Lotions applied to the Thigh.*

| Number. | Subject. | Sex. | Age. | Date.            | Substance.       | Strength.                 | Quantity used. | Applied for hours. | Urine collected for hours. | Reduced by evaporation to. | Tests used.                                                                                                                                                                                                     | Results.                               | Remarks. |
|---------|----------|------|------|------------------|------------------|---------------------------|----------------|--------------------|----------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|----------|
| 29      | F.       | M.   | 16   | 14th Sept., 1903 | Acetate of Lead. | 2 grs. to 1 oz. of water. | Pints 3        | 96                 | 72                         | To dryness.                | Burnt residue in a crucible and acted on the ash with NO <sub>2</sub> & dil. filtered, and evaporated, the filtrate to dryness, redissolved in HO, and passed a current of H <sub>2</sub> through the solution. | No evidence of Lead could be detected. |          |
| 30      | D.       | M.   | 23   | 14th Oct., 1903  |                  | 10 grs. to 1 oz. of HO.   | Ounces 3       | 11                 | 24                         |                            |                                                                                                                                                                                                                 |                                        |          |

*Infusions applied to the front of the thorax.*

|    |    |    |    |                   |             |                               |        |    |       |       |       |                                                              |                                                                                                                       |
|----|----|----|----|-------------------|-------------|-------------------------------|--------|----|-------|-------|-------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 31 | D. | M. | 23 | 30th Sept., 1903. | Belladonna. | 1 dr. of extract to 1 oz. HO. | 2 oz.  | 4  | ..... | ..... | ..... | 4 hours after application, pupils were considerably dilated. | Suffered from a burning sensation of the skin and had vertigo more or less severe cephalalgia for several days after. |
| 32 | A. | M. | 26 | 2nd Oct., 1903.   |             | 1 dr. E. B. 1 oz. HO.         | 6 drs. | 15 | ..... | ..... | ..... | Pupils unaffected.                                           |                                                                                                                       |

# EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

## *Tinctures applied to the thorax.*

| Number.                                 | Subject. | Sex. | Age. | Date.             | Substance.     | Strength.                 | Quantity used. | Applied for hours. | Urine collected for hours. | Reduced by evaporation to. | Tests used.                                                                                                                                                                                                                                                                                                                                                   | Results.                               |  |
|-----------------------------------------|----------|------|------|-------------------|----------------|---------------------------|----------------|--------------------|----------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--|
| 22                                      | D.       | M.   | 23   | 16th Oct., 1893.  | Opium.         | grs. 4 to 1 dr.           | 6 drs.         | 12                 | .....                      | .....                      | .....                                                                                                                                                                                                                                                                                                                                                         | No effect on the pupils.               |  |
| 24                                      | B.       | M.   | 24   | 16th Oct., 1893.  |                | "                         | 6 drs.         | 12                 | .....                      | .....                      | .....                                                                                                                                                                                                                                                                                                                                                         | .....                                  |  |
| 25                                      | C.       | M.   | 17   | 14th Nov., 1893.  |                | "                         | 3 drs.         | 12                 | .....                      | .....                      | .....                                                                                                                                                                                                                                                                                                                                                         | .....                                  |  |
| <i>Ointments applied to the thorax.</i> |          |      |      |                   |                |                           |                |                    |                            |                            |                                                                                                                                                                                                                                                                                                                                                               |                                        |  |
| 26                                      | D.       | M.   | 23   | 23rd Sept., 1893. | Oxide of Zinc. | gr. xii to 1 dr. of lard. | 24 drs.        | 24                 | 24                         | To dryness.                | Heated the residue in a crucible, until reduced to ash, dissolved the ash in dil: HCl, filtered and added to filtrate NH <sub>4</sub> O, NH <sub>4</sub> Cl, and NH <sub>4</sub> Cl, a greenish precipitate was thrown down and dissolved in dil: HCl, heated it to boiling, added KO in excess and then passed a strong stream of H <sub>2</sub> through it. | No evidence of Zinc could be detected. |  |
| 27                                      | B.       | M.   | 24   | 26th Sept., 1893. |                | "                         | 5 drs.         | 24                 | 24                         | To dryness.                | .....                                                                                                                                                                                                                                                                                                                                                         | .....                                  |  |



## EXPERIMENTS ON ABSORPTION BY THE HUMAN SKIN.

*Ointments applied to the thorax (continued).*

| Number. | Subject. | Sex. | Age. | Date.             | Substance. | Strength.                | Quantity used. | Applied for hours. | Urine collected for hours. | Reduced by evaporation to. | Tests used.          | Results.      | Remarks.                                                                                   |
|---------|----------|------|------|-------------------|------------|--------------------------|----------------|--------------------|----------------------------|----------------------------|----------------------|---------------|--------------------------------------------------------------------------------------------|
| 38      | M.       | M.   | 23   | Sept. 26th, 1883. | Opium.     | 5 gr. to 1 dr. of lard.  | 3 drs.         | 12                 | ..                         | ..                         | State of the pupils. | Not affected. |                                                                                            |
| 39      | M.       | M.   | 24   | Oct. 2nd, 1883.   | ..         | ..                       | 4 drs.         | 12                 | ..                         | ..                         | Small of the urine.  | Positive.     | The urine passed on the 1st day had a stronger tarry smell than either the 2nd or 3rd day. |
| 40      | F.       | M.   | 38   | Oct. 14th, 1883.  | Tar.*      | 1 oz. Tar to 1 oz. lard. | 2 oz.          | 72                 | 72                         | ..                         | ..                   | ..            |                                                                                            |

\* Applied to the calves of the legs.

## REVIEW

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*A Practical and Theoretical Treatise on the Diseases of the Skin.* By GEORGE NAYLER, F.R.C.S., Assistant Surgeon to the Hospital for Diseases of the Skin, Bridge Street, Blackfriars. London: John Churchill and Sons, pp. 292. 1866.

We are altogether opposed to the growing practice—we had almost written nuisance—now so common in London of special hospitals. We, in India, treating all varieties of disease, readily understand the feeling of provincial practitioners at home, who cannot complacently see their patients running off to a metropolitan specialist on every occasion, when anything more serious than a common cold, or accidental colic disturbs the even tenor of their way. Should specialities increase, as they have done during the last twenty years, there will soon be little remaining among even the great mass of human ailments to fill those magnificent General Hospitals, which for generations have been, and, we earnestly hope, will ever be the pride of Londoners. Foreigners, and especially Louis Blanc, in his “Letters from England,” dwell upon the hospitals of London as among the more enviable characteristics of our Leviathan metropolis. Any one acquainted with the interiors of the noble piles forming “Guy’s,” “Bartholomew’s,” “St. George’s,” “St. Mary’s,” and kindred institutions; and knowing the calibre of the men forming the medical staffs, would scarcely suppose superior

accommodation, or higher professional ability could be found elsewhere. But not a few of the promoters of special hospitals unblushingly assert, either in the prospectus of the institution or in the pages of the special work usually published, a capability of diagnosing and treating particular maladies, which money cannot elsewhere procure. The sums expended by each special hospital for periodical appearance in the advertisement sheet of the *Times*, would form a considerable addition to the income of many a general practitioner; could the monies be diverted into such channels. There are special hospitals for men, special hospitals for women, and special hospitals for children. There are Homes, Infirmarys, Dispensaries, Retreats, and consulting Rooms; and each of these establishments are professedly for the purpose of treating one class of disease only. Almost every organ is honoured with its special curative institution—insanity is treated in one; epilepsy in another; a third administers to the ear; a fourth to the eye; a fifth claims all sufferers from hæmorrhoids; a sixth will not condescend to inspect the rectum, but confines its operations to the upper end of the internal mucous membrane. Then the chest, the teeth, the urinary organs, and particularly calculus, can never be treated, according to certain writers, *cito, tuto, et jucunde* without the walls of their special temples! Cancer, small-pox, syphilis, fever, dipsomania, and ulcerated legs, *cum multis aliis*, tedious to recapitulate, might be added to the list. And while we unhesitatingly assert, that this multiplication of specialities is neither beneficial to the public, nor to the great mass of the profession, we at the same time are free to confess that some few are decidedly the reverse. Among this minority we would class special institutions for the treatment of Diseases of the Skin. Dermatology has, indeed, long been regarded as a legitimate speciality. The diagnosis

and treatment of the various maladies to which our cutaneous surface is liable, are arts only acquired after a more prolonged study of the appearances presented, and accompanying circumstances, than most physicians, surgeons, or general practitioners are able to afford. By common consent Dermatology has long since been resigned to the specialist. But although we admit the propriety or, perhaps, necessity, in this and some few other instances, we fail to perceive any legitimate reason why the whole nosology should be divided into as many specialities as there are diseases, or even fancied diseases, to wit, "Clitoridectomy." Soon under the influence of such subdivisions medical men who profess to treat all comers, must in London become shadows of the past, excepting among those employed by Poor Law Commissioners, and Boards of Guardians—assemblies not likely to afford their pauper "responsibilities" the luxury of special consulting doctors.

Having thus exempted Mr. Nayler from the parasitical herd of superfluous advertising alienists, we may turn to his book with some degree of satisfaction. And the first few glances into the handsome volume before us tend to confirm this feeling. Got up in Churchill's best style, our readers who know what that is, will readily appreciate the compliment, when we state that the matter is more than worthy of the type and paper, in which it is set before the professional public. Contrary to the publications of too many specialists, Mr. Nayler's work is written for medical men, and not for laymen. Doubtless it will lay on the table of his consulting room, and be there seen by the numerous patients we hope which, attend, but the work is too technical to afford them either amusing, sensational, or instructive reading. They may peruse the title page and the gold lettered-back,

but all attempts to attack the interior would be frustrated by the purely professional language used. Even the exquisite plates, of which there are eight at the commencement of the work, would scarcely, with the exception of that of the "Acarus," afford a sensation. The first chapter is devoted to a description of the anatomy and physiology of the skin, and this we think might have been omitted. With the exception of the results of an analysis of the cuticle, this portion of the volume contains nothing but what every well-informed medical man is well acquainted with.

As far as regards the anatomy of the organ, the chapter is certainly a masterly *resumé*; but the physiology is somewhat imperfect. For instance, we do not notice any reference to the recent experiments carried on by Professor Pettenkofer and Mon. Henneberg.

In perusing Mr. Nayler's work, we have been agreeably impressed with the evident tendency of the author to simplify Dermatology. Many observers, Wilson and Hebra, especially, have divided and subdivided, until the minute gradations and changes marking each variety, exist only in the skilful diagnosis of the adept. Mr. Nayler does not do this. In the article on Psoriasis, he also includes Lepra, and remarks that in their general character, they so nearly resemble each other, that they may be ranked under the same head. With regard to the treatment of these inveterate skin affections, the author endorses all hitherto written in favour of Arsenic. He has seldom seen injurious results from arsenic, taken even for lengthened periods; a flushed cheek, preternatural redness of the conjunctivæ, and irritability, often sufficient to prevent sleep, giving ample warning, when the mineral exceeds its curative limit. In

the inflammatory stage of either complaints, specific treatment is not recommended.

The chapter on that peculiar affection termed "Ichthyosis" is well worth perusal. The analysis of the hypertrophied outicle forming this disease, is compared with that of natural outicle, showing a great excess of inorganic or mineral matter in the latter. In the description of this malady, Dr. Nayler's tendency to simplify Dermatology is again apparent. He regards "pityriasis" as the connecting link between psoriasis and ichthyosis.

Passing over the chapter on "Lichen," we turn to the different varieties of "Prurigo." The author does not adopt the views of Allibert, who attributes the intolerable itching, so frequently accompanying this affection, to the existence of pediculi. In this, however, Mr. Nayler is at issue with very many recent observers. As we perceive in a late number of the *Medical Times and Gazette*, Mr. Balmanno Squire has recently insisted on the fact, that prurigo is commonly due to pediculus corporis. Dr. Hillier again, who has charge of the Skin Department of University College Hospital, accepts similar views. And among continental authorities we may quote Hebra, and the older author Rayer, who figured the pediculus in his plates of prurigo. Probably in a future edition, Mr. Nayler will find reason to modify his sweeping assertion, that "no form of prurigo is in any way dependent on pediculi." The treatment of this form of skin disease is, according to our author, more constitutional than local, although he confesses great relief is often experienced from topical applications. Chloroform and camphor liniment are favourably spoken of. An old formula we can recommend for this distressing malady, especially in elderly people, is

simple ointment and *stavesacre* powder. When, says Mr. Nayler, the origin of *prurigo genitalium* is a vascular growth near the meatus, it should be excised from the base. We are happy to find, the author does not recommend recourse to Mr. J. B. Brown's "Clitoridectomy."

The affection known as "favus" receives considerable attention, and the theory of cryptogamic origin is supported. The microscopical characteristics are fully given both by plate and letter press, and the manner in which the fungus destroys the hair fully explained. Mr. Nayler thinks under the influence of better hygienic conditions, "favus" is annually becoming less frequent in London. At the Skin Hospital it is now seldom seen, but the hospital for sick children has afforded opportunities to the author of investigating the malady. As a curative agent, epilation is recommended, although we are informed that the practice is seldom had recourse to in England. Dr. Hillier, however, if we recollect right, pursues this course at University College; so does Neligan in Dublin; and Hardy in Paris. Poultices, until the crusts are removed, and afterwards pitch ointment is also good practice.

But we cannot follow Mr. Nayler through the whole of his very interesting volume. Eczema, Pompholyx, the different varieties of Herpes, Impetiginous affections, Ecthyma, and Rupia, Alopecia, Sycosis, Scabies, Elephantiasis, morbid growths in the skin, and many other maladies are fully treated. There is also an article on the "Diseases following vaccination," and we are glad to find Mr. Nayler lending the weight of his authority in the affirmative, to the disputed question whether syphilis can be so propagated. Firmly believing in the efficacy of vaccination, as a prophylactic against variola, we are, at the same time convinced

that other diseases may be communicated with vaccination. This, however, is no valid reason, why the operation of vaccination should be regarded with less favour. As well may we avoid the railway, and return to the bullock hackeries of our predecessors, because accidents occasionally happen on the iron road. The fact (which we regard as settled beyond *dispute*) that vaccination can convey disease, should merely prove the incentive to extreme care in all steps of the operation, and propagation of the lymph. And such circumspection, we fear, is too frequently neglected, both in this country and at home.

Before closing Mr. Nayler's book we may record our opinion, that it is one of the best works on Diseases of the Skin, we have ever perused. Verbosity is studiously excluded, the diction is clear, and the descriptions free from confusion, while the treatment recommended is not characterized by speciality, to the exclusion of general principles. In conclusion we may mention that Mr. Nayler was, we believe, formerly for some years an Assistant Surgeon in the Bombay Service, having gained the appointment given in 1852 by one of the Directors, for competition at St. George's Hospital. At that time it was the good old custom to attach young Assistant Surgeons to the Presidency hospitals for a few months, in order that they might attain an insight into Indian diseases, study the language, and show the authorities, their metal and calibre. Coming out with first class certificates from the professors of St. George's, and with the prestige of having won his appointment by *concours*, Mr. Nayler was considered sufficiently well-informed to be sent up-country at once. He had, therefore, no opportunity of becoming connected with the Presidency institutions. Having been knocked about in upper Scinde, in the Indian Navy and in



the Persian Gulf, and elsewhere, he with failing health retired from a service, in which ability and merit were not the only certain claims to success.

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# HOSPITAL OR CLINICAL CASES. MEDICAL.

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## CASES OF FUNCTIONAL DISEASE OF THE NERVOUS SYSTEM,

BY

A. GARDEN, M.D.,

CIVIL ASSISTANT SURGEON, SAHARUNPORE.

### I.—*Spinal Paresis; Partial Paralysis and Tremor of the right side. Recovery.*

NUTOOA THYLE, aged 30., admitted into the Saharunpore Dispensary, March 3rd, 1866.

*History.*—Suffered from syphilis three years ago. Has suffered but little from fever, and has, as a rule, enjoyed good health. A month ago he walked to Deyrah, a distance of fifty miles, without stopping, and was very much fatigued by the journey. Soon after his arrival at Deyrah he noticed weakness and tremor of the right arm and leg, with some difficulty in walking, during which he constantly struck his foot against any object lying in his way. Is not aware of having caught cold. Was in his ordinary health, able to work and walk as usual, previous to going to Deyrah. He was obliged to make his way home again on foot. During this second journey the symptoms became much worse and have not decreased since.

*Present condition.*—Looks weak and anæmic. Appetite good. Bowels regular. Tongue clean. Sleeps well. Pulse 72, small, and weak. No pain, or uneasiness. There is no affection of the sensory nerves at all.

*Face.*—Slight paralysis of the right side of the face, not very marked during quietude. The left angle is drawn up when the mouth is opened, and the uvula is drawn to the same side. The tongue is protruded quite straight. He can close the eyelids. Buccinator unaffected.

*Right arm.*—Weak and powerless to a great degree, can raise it, but with difficulty. Complains of stiffness of the muscles. Great tremor of the limb whenever he attempts to use it; but otherwise it remains quiet when he is at rest. Finds it impossible to feed himself, as he cannot bring the tips of the fingers together to take hold of his food, nor carry his hand with certainty to his mouth.

*Right Leg.*—Great difficulty in rising from the squatting position. On standing, or attempting to walk there is tremor of the whole limb. There is also great want of power. In progression the leg is flexed, and raised slowly whilst the foot is carried round, as if avoiding some obstacle, instead of straight forward. As with the arm, the tremor ceases when he is at rest, and is not constant as in *paralysis agitans*.

Ordered Pot. Iodidi grs. iv., Ferri Sulph. grs. iii., Decoct. Hemedismi ʒii, three times a day.

*March 9th.*—Great improvement; no tremor; more power in the leg. Can feed himself, but still experiences considerable difficulty in bringing the tips of the fingers together. Complains of spasm in the muscles of the forearm when using it.

*15th.*—Doing well. Add Strychnia gr. i. to each dose. Omit the Pot. Iodid.

*28th.*—Can walk much better, the foot being carried straight forward. Still some want of power in the hand.

After this the improvement continued gradual and steady. He remained under treatment till the end of April, when he returned to his home nearly well.

*Remarks.*—The nature of this case admits of no doubt, being one of spinal paresis, the result of exhaustion of nervous power. On first seeing the patient, and judging from his appearance, there seemed some probability that it was a case of functional nerve disease arising from malaria, which, as a cause predisposing or exciting, stands in relation to so large a proportion of the functional nerve affections met with in this district, in which cephalalgia, neuralgia, &c., are more common even than fevers. According to the patient's account he had suffered but little from fever, and this may have possibly been the case, though there may have been that silent undermining of the vital powers by malaria, so commonly met with, to act as a predisposing cause. The patient's appearance at all events tended to point this out to be the case. There was a history of syphilis, of chancres three years before, but I am not inclined to view the paralysis as one of the manifestations of the syphilitic diathesis. The affection followed too close on a more efficient cause, and the onset was too sudden, though like malaria, the syphilitic taint may have been a predisponent. The exciting cause was without doubt the long and unusual strain put on the nervous system, producing exhaustion of the motor columns, just as loss of mental power will follow excessive brain work, or neuralgia follow any nervous exhaustion, the sensory nerves being involved instead of the motor. No history could be gained from the patient, unobservant as most men of his mental calibre are, as to the succession of the symptoms, whether the paresis occurred from below, upwards, or was simultaneous for the whole parts affected. The affection

of the arm and leg was equal, but that of the face was comparatively slight and unknown to the patient, and there is a possibility that it occurred after the limbs were affected, and as a result of the increased exhaustion caused by his having to make his way home on foot. It is worthy of note that it occurred on the same side as that of the arm and leg, and that the tongue was not affected. This fact is of very frequent occurrence in cases of malarious paresis of the sensory nerves, in which neuralgia of the 5th nerve is met with, concurrent with neuralgia and debility of the limbs of the same side.

The tremor, which, if more persistent, and in an older patient, would have been termed *paralysis agitans*, is another symptom of the spinal paresis. It was confined to the arm and leg, and only showed itself when the muscles were called on to act through the debilitated spinal system. Dr. C. H. Jones, in his work on "Functional Nervous Disorders," calls attention to the distinction between the curable functional tremor, and *paralysis agitans*, accompanied by changes in the nervous centres as atrophy, &c., and quotes the opinion of Cohn who considers, "Tremors as paretic debility and not as spasm, and derives it from the failure of the tone of the voluntary muscles which they receive from the nervous system. The causes of spasm and tremor are the same."

This case is, I think, corroborative of the above opinion. The access of the tremor and the paralysis were simultaneous; both symptoms increased together, and disappeared. The tremor, however, much sooner than the paralysis, when appropriate treatment was employed. It will be also observed that during the progress of cure, the patient suffered much from spasm of the forearm, after the tremor had disappeared;

the cause of tremor and spasm being, according to Cohn, the same.

A few words as to the treatment. The remedies required were rest and good diet, and nervine tonics. Of these, iron in combination with Potassii Iodid. was given at first. The latter of the two drugs was used for the purpose of combatting the possible syphilitic taint, but I may state that in my experience there is no more powerful remedy for diseases connected with malarious cachexia, than the Iodide of Iron, or what is more attainable in dispensary practice, a combination of Potasii Iodid. and some form of iron. Galvanism would have been tried had the patient been willing to submit to it, but as he refused, I preferred treating him without it to his going away to his home uncured, as he most certainly would have done, had it been insisted on.

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II. *Headache two months before. Recurrence of headache with vertigo. Partial paralysis of left side. Recovery.*

Narain—æt. 29, Bunneah. Admitted September 5th, 1866.

*History.*—Had syphilis three years ago. At the end of June was under treatment at the Dispensary for congestive headache, which yielded to purgations and blisters. The pain was intense and confined to the right side. On September 3rd, the pain in the right side of the head suddenly recurred with vertigo and confusion of thought, but no insensibility. This lasted for three hours, and then passed off, leaving him quite sensible, but unable to articulate, and with partial paralysis of the left side of the body.

*Present condition.*—There is great weakness in the left arm and leg, but not complete palsy. He can raise the arm with an effort, and in walking drags his leg. The muscles of the right side of the face are slightly paralysed. The mouth being drawn a little to the right side; he can close the eye-lids. The motions of the tongue are impaired, so that he is unable to articulate so as to be understood. His mind and perceptions have remained quite clear since the attack. Tongue clean; bowels regular; appetite good. Calomel gr. i. three times a day.

Ung: Hyd. Bionidide (gr. x. to ʒi) to the scalp.

*11th.*—Can speak intelligibly; paralysis of limbs less.

*March 11th.*—Improved; paralysis of face scarcely to be noticed. Calomel gr. ii. at bed time.

Pot. Iodidi gr. v., Decoct. Hemidismi ʒii three times a day.

*17th.*—Nearly well.

After this he ceased to attend.

*Remarks.*—During the patient's illness in June I did not see him, but judging by the symptoms, and results of treatment, he was suffering from hyperæmia of the right brain, hence I have classed it amongst the cases of functional disease. The symptom was intense headache confined to the right side, and yielded to depletory measures. He remained tolerably or quite well for two months up to the time of the second attack, which commenced in the same way with intense headache of the right side, accompanied by vertigo, confusion of thought, but no insensibility. This lasted three hours, and then passed off, having left partial paralysis of the body, with right partial paralysis of the face and

tongue. What was the nature of this second attack, organic or functional? The seat of the lesion was on the right side, and above the decussation of the fibres in the *medulla oblongata*, most probably on the right hemisphere of the brain, but the question is whether there was merely a temporary disturbance of the circulation and nutrition of the brain, a functional disorder, or whether there was a true apoplexy, as the term is usually understood—that is an effusion of blood. Much assistance would have been gained if the patient could have been seen whilst the headache lasted, but as it is we have only the obscure statements of his friends to depend on. The existence of purely functional disease; *i. e.*—of disease without change of structure, is a matter still *sub judice*, and each year seems to remove some of the functional diseases into the domain of the organic diseases; *e. g.*—Tetanus, through the investigations and discoveries of Lockhart Clarke, F.R.S., and the determination that in cases of concussion minute apoplectic clots exist in the brain (*vide Holme's Surgery*), but still there are numerous affections of the nervous system which may, in the absence of more perfect knowledge on our part, be termed functional, all evidence of change of structure being still wanting. Whilst the first attack, and the first symptoms of the second were functional, I should have been inclined to class it amongst the apoplexies, were it not for the extreme rapidity with which the symptoms were removed; and whilst admitting that blood might have been effused, I cannot but consider that it must have been very small in quantity, and into the structures at the base of the brain. The rapid return to health, within two or three weeks, is not an usual occurrence with apoplexy; so that there is a great probability in the absence of the proof positive, that the symptoms were produced by the altered nutrition of the portions of the brain



implicated. Another point of interest is, how far the symptoms were connected with or influenced by the syphilitic diathesis. This, in the absence of a fuller history of the man's case, it is impossible to form an opinion on, but probably the influence was considerable—witness the apparent effects of the anti-syphilitic remedies used.

As customary with dispensary patients, he did not continue under treatment until pronounced cured, but ceased to attend as soon as he was sufficiently recovered to do his usual work.

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III. *Syphilis fifteen years before. Paresis of spinal cord. in both sides, of motor and sensitive nerves; Frontal neuralgia.*

Khyratee, æt 30, Carpenter; admitted 15th September, 1866.

The patient had been under treatment for pains in his legs, diagnosed as rheumatism, for ten days before I saw him. Struck by his peculiar gait I questioned him, and found that there was paralysis, as well as pains in the legs.

*History.*—He is a weak, cachectic-looking man, with a sallow greenish yellow color. Had syphilis primary, and secondary, fifteen years ago; and has all the appearances now of the syphilitic diathesis. After some difficulty was brought to acknowledge that prior to the attack he had been addicted to excessive venery.

Twenty days ago, (ten days before coming to the dispensary) he suffered from severe pain in the belly and costiveness. He took a strong purgative, which effectually emptied his bowels. Soon afterwards he began to experience pains and

abnormal nervous sensation, such as tingling and creeping and at the same time weakness in both legs. These symptoms have increased since. He has received no injury. His means are good.

*Present condition.*—September 23rd, 1866. There is great weakness of both legs. In walking the legs are kept wide apart to maintain the balance, and the feet are raised, and put down quickly and sharply. Much pain in both legs, with tingling, and creeping sensations, worse at night. In the right leg there is also numbness and sensation of coldness. Perspires freely all over the body. And there is complete anidrosis of the legs. No spinal tenderness. Pulse 120, small. Tongue furred. Bowels costive. Appetite good. No fever lately, but had diarrhoea some weeks ago.

Ung. Hydrarg Biniod. (gr. x. to ʒi.) to spine.

Hyd. Bichlor. gr. ʒ, Ferri Iodid. gr. iv., Inf. Cheyrettæ, ʒi, three times a day.

29th.—Improved. Much more power in his legs, no pain. Sensation of numbness less.

*October 1st.*—Complains now of coldness in the right leg, but the sensation is nearly normal. Power increased. After this he continued to attend for two or three weeks and regained the complete power in his legs, though the sensation of coldness in the right foot continued. His general condition was also much improved. On November 7th, he returned in a very weak condition, having had a severe attack of fever. He could walk well, but complained of coldness and creeping sensation in the feet. Much perspiration. A little pain in the knees. Pulse very weak. Tongue clean. Appetite good. Strychnine gr. ʒ, Ferri Iodid. gr. v., Inf. Cheyrettæ ʒi.

He continued under treatment for a month. The creeping sensation, and coldness of the feet, were lost, and he picked up flesh, and gained strength. He then ceased to attend.

*January 9th.*—Has returned on account of pain in the course of the frontal branch of the third division of the fifth nerve, of three days duration, and paroxysmal. Has no want of power in the legs, nor any of his former abnormal sensations. Ferri sulph. gr. iv., Ext. Belladonnæ. gr.  $\frac{1}{2}$  three times a day. Attended on the 10th and 11th, and gained benefit from the medicines.

*24th.*—Has returned in a weak condition. His face has assumed a decidedly cachetic look again. On being pressed, confesses to self-abuse of late. There is no return of the spinal paresis, but complains of pain almost constant in the position of the frontal sinus, and extending paroxysmally over the whole head with great throbbing. Pain much worse at night. In the morning there is little or no pain, but it commences in the afternoon. There is always tenderness over the frontal sinus, and a dull ache. There is a distinct depression instead of elevation in the position of the sinus. No nodes frontal or others.

Pot. Iodidi. gr. v., Ferri sulph. gr. iv., Tr. Opii. m. x., Infus. Cheyrettæ ℥i., three times a day.

Pulv. Ipecac. c. Opio. gr. x., Calomel gr. i. at bed time.

On the 29th the pain was much less; on the 30th after rain, it again increased. Hydr. Bichlor. gr.  $\frac{1}{2}$  was added to the mixture. It was less on the 1st, but again more severe on the 2nd of February. Ext. Belladonnæ gr.  $\frac{1}{2}$  was added to each dose, after which the pain gradually disappeared, and he was, on the 7th entirely free from it.

*February 9th.*—The patient is still under treatment; he is much improved in every way; has lost the cachectic look and can do his work; but he says now that one or two days he has noticed tremor of the legs.

*Remarks.*—This case is a good example of functional nervous disease modified, if not induced by the syphilitic diathesis. The history is that of primary and secondary syphilis, and of a long latent period of thirteen or fourteen years, during which no active symptoms made their appearance. There are other circumstances to be noted, as leading to the failure of the nervous power. The first of these is excessive sexual intercourse, and self-abuse as afterwards confessed to. This is of itself sufficient to account for the spinal paresis, being one of, if not the most, common causes of this and other functional disease of the nervous system. The second circumstance is that his powers had been much exhausted by an attack of diarrhoea. Whilst in this condition he suffered from an attack of colic, itself a symptom of weakened nerve power, to relieve which he took the worst medicine he could; *viz.*, a native purgative which is synonymous with a drastic purge amongst natives, who suffer much from debility of the nervous system as a result of exposure to malaria; colic is a common complaint, and is undoubtedly a symptom requiring stimulation, and renewal of the nervous powers, instead of depleting measures for its cure. So impressed have I become with the truth of this, that in all such cases I depend chiefly on opium, and nervine tonics, with a mild laxative when the spasm of the muscular coat of the intestines has been overcome. The sequence of the occurrence of the patient's symptoms is uncertain, but from the fact of his seeking aid first for the pains in his legs, we may infer that the sensitive columns, of the lower

portion (lumbar) of the spinal cord, were the first affected. Following and combined with the pain, there were other symptoms of disordered sensation, tingling and creeping. From the first they were more marked in the right, than in the left leg, and were first developed in it. The paralysis was most probably secondary to the disordered sensation, and it was more marked in the right leg. In their disappearance, the symptoms followed an inverse order. The motor nerves first recovering power, whilst the abnormal excitation of the sensory nerves was replaced by a condition more akin to the paralysis—*vis.*, numbness and a sensation of cold in the right leg. Under treatment, directed against the syphilitic taint, the patient made good progress, but ceased to attend before the cure was complete.

An attack of remittent fever, at the end of October, reduced his strength, and there was a slight recurrence of the symptoms, commencing, as in the first attack, with abnormal nervous sensations, as tingling, in addition to the partial anæsthesia, or numbness which had never left his right foot. As usual in cases of nervous debility, there was profuse action of the skin. Under the use of strychnia, and iodide of iron, he rapidly improved again, and when well enough to work, ceased to attend. His next attendance was early in January, 1867.

The locality of the manifestation of the nerve disorder was changed, to the first division of the fifth, in which we may see the addition of malaria to the other causes, or possibly it was merely an indication of the syphilitic diathesis, which shows itself in so many forms and shapes. The treatment was directed against the nerve complaint, and the Belladonna and iron did much good. He again disappeared

to seek aid after thirteen or fourteen days, with more intense affection of the first division of the fifth nerve, on both sides with a localised painful spot over the frontal sinus. The syphilitic taint again appears strongly in the nocturnal severity, and the condition of the frontal sinus, and the pain in it. The remedies were directed against the syphilitic taint, and also to restore the nervous tone, with Belladonna added afterwards. The result as regards the pain was most favourable, and rapid, as it entirely ceased after eight or nine days. The effect of the Bichloride of Mercury and Pot. Iodidi. on the appearance of the patient has on two occasions been most marked, a tolerably sure indication of the rôle played by syphilis in the case. Unfortunately there is something more to be conquered than the syphilitic diathesis. I allude to the man's entire habits. These, I fear, there is no cure for; he is advanced in life, and has been addicted to them for long. Even now the tremors of the legs, as a symptom of spinal paresis, seem to point to the fact that he continues this vile habit of self-abuse.

The case, though not complete, as regards its ultimate termination, is still sufficiently so, to possess great interest. On the subject of treatment I need add nothing. It was entirely directed against the syphilitic taint, and want of power in the nervous system. The patient's prospects however are but dubious, as there seems to be no possibility of removing one of the main causes of his disorder.

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IV. *Epilepsy occurring at long intervals, during the night, from excessive sexual intercourse.*

Jumno Dasse, æt 50, Bunniah, admitted November 20th, 1866. A pale bloated-looking man.

*History.*—For five years past has suffered from epilepsy; the fits recurring at first every four or five months, but of late much more frequently. Has undergone much treatment at the hands of the *hakems*, but without benefit, and is in daily expectation of the occurrence of a fit. They always come on during sleep after midnight, never in the day time. He is quite unaware of their occurrence until after their cessation. There is no aura, or premonitory symptom. They commence with a loud cry followed by the ordinary convulsions; the tongue is bitten; there is frothing at the mouth, and complete insensibility. Suffers much from prostration afterwards. Has been getting weaker, and for some time past has suffered much from giddiness and inaptitude for mental application.

*Present condition.*—Vertigo. Cannot apply himself to his business for any length of time. Weakness; conjunctivæ pale; gums swollen, soft, red, bleeding on the slightest touch, receding from the teeth. Pulse weak, 84. Tongue pale, flabby, indented at the edges. Heart's sounds weak. Appetite good. Bowels regular.

Zinc Oxid. gr. iii, Ferri. Sulph. gr. iii, Inf. Digitalis ℥i, three times a day. Good diet. Lime juice.

25th.—Gaining strength; gums less swollen; do not bleed when touched; very little vertigo. Says now that he has suffered from spermatorrhœa for years. Admits also excessive sexual intercourse.

February 1867. The patient who lives at a distance has shown himself every ten days. He is much improved in every way. Has regained his strength, never suffers from giddiness. Can do his work without fatigue. His gums

are normal. The conjunctivæ red. The spermatorrhœa has stopped for some time.

The fits have not recurred once since he came under treatment.

*Remarks.* It is generally admitted, that epilepsy is a functional disorder in all essentials, consisting according to Schröder Von der Kolk in an exalted sensibility of the medulla oblongata (*vide New Sydenham Society's translation*, by Dr. W. D. Moore. Professor Kolk, on the "*Spinal Marrow*," &c.) In this case it was the result of the excessive sexual intercourse. Commencing with long intervals, it was gradually getting worse and worse, as the convulsive attacks occurred with greater frequency, and the mental powers were to a degree impaired. The condition of the medulla oblongata was the result of exhaustion, of want of power; the patient was weak, anæmic, and scorbutic, his gums being swollen, soft, and readily bleeding. What in this case produced the discharge of the excited and irritable medulla oblongata it is impossible to say. The fits always occurred at night, and without warning, as far as the patient knew, or would confess. At one time, it seemed possible that the exciting cause might have been connected with irritation of the digestive canal, as he at first said, but afterwards denied, that they always followed an extra rich or full meal, which he, as a rule, took just before going to sleep. In the character of the attacks or their after effects, there was nothing peculiar.

As the patient was anæmic the treatment was directed to this, and also to improve the tone of the nervous system. For this purpose Oxide of Zinc and Sulphate of Iron were given. The Digitalis Infusion, which I have found useful in



other cases of epilepsy, was given in accordance with the recommendation of V. der Kolk, who says that, whilst it is not powerful enough to cure, it may promote that end, by diminishing the determination of arterial blood, and so indirectly counteracting the exalted sensibility of the spinal cord.

I do not presume to say that a cure has been effected but the result of the treatment, as far as it has gone, is most satisfactory. There has been no recurrence of the fits for some months, and the patient's condition is in every way improved. His mind has regained its vigour in great part, and his blood is in a more healthy condition.

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*V. Partial Paralysis of the Gustatory and Hypoglossal Nerves. Spasm of Sterno Mastoid, Sterno—hyoid and Sterno—thyroid Muscles. Recovery.*

Ram Bux, æt 50, Rajpoot. Admitted 5th December, 1866.

*History.*—Present illness commenced a year back with pain at the back of the neck, and in the loins. The pains afterwards extended to the head. They were always worse at night, and shifted their position constantly. They lasted very severely for three or four months. About the same time, he began to notice some difficulty in speaking, and also in swallowing, and these symptoms have become worse by degrees. During the same period, he has had constant spasmodic attacks in the sterno—mastoid, in the sterno—hyoid, and sterno—thyroid and omo—hyoid muscles, and at the same time swellings in the same muscles. Has lost the sense of taste in great part. Has lost flesh, and become very weak. Mental powers impaired. Has been much given to venery; denies syphilis.

Has been treated by *leksems* but without benefit.

*Present condition.*—Anæmic; appetite bad; bowels costive; tongue furred; flabbily; indented at the edges; pulse 96, weak; heart's action and sounds weak; the right side of the face is slightly paralysed. Can close the eyelids firmly. The angle of the mouth is drawn a little to the left, as if the muscles on the right side were weak. The tongue, when protruded, is curved to the left side, the right margin lying on the left central incisor. Whilst eating, the food collects between the cheek and the jaw. Finds much difficulty in swallowing, the alimentary ball seemingly being stopped at the fauces. Uses his finger to pass it beyond. At the sternal end of the left sterno-mastoid muscle, there is a hard thickening.

Cannot walk far. Sight and hearing good. No pain in the head; no vertigo.

Hydrarg. Bichlor. gr.  $\text{r}$ , Strychine gr.  $\text{r}$ , Ferri Sulph. gr. iv., Acidi. Sulph. dil. m. x., Inf. Cheyrettæ  $\text{ʒi}$ , three times a day.

Liniment: Ammonia.

9th.—Much improved. No difficulty in swallowing.

10th.—Can taste fairly. The tongue protruded more in its proper direction. No paralysis of the muscles of face. Speech much clearer than it was at first.

Swelling in sterno-mastoid nearly gone.

13th.—Improvement continuing. After this he went to his home, as he had some urgent business, and did not return

*Remarks.*—At first sight, there seemed a great probability that the nervous affection in this case was connected with syphilis, but the patient would not admit that he had ever suffered from it. This is not proof positive that he really never had had the disease, but in the absence of other proofs we must allow a certain credit to his assertion. The points that seemed to me to point to the syphilitic diathesis, were the shifting rheumatism-like pains, the nocturnal exacerbations, and the temporarily persistent swellings of the muscles, which were not bulgings from spasm, but to all appearances actual deposits, or increase in substance. Laying aside syphilis as the cause, the only other tangible one is excessive sexual intercourse, for there was no history of fever or other exhausting disease. This, however, is quite sufficient to account for the condition of the medulla oblongata, for in it was undoubtedly situated the want of power, which led to the symptoms, for which the patient sought relief. In the other cases we have seen the same cause in operation—in one in combination with the syphilitic diathesis to produce partial paraplegia, and in another to lead to epilepsy through the excitable condition of the medulla oblongata, which is the primary abnormal condition in that affection. In the present case it seems to have led to a state of debility of the same portion of the cerebro-spinal system, and from this originated the spasms of the muscles of the neck, and the paralysis of the tongue and fauces, and of taste. The nerves chiefly implicated were the hypoglossal, third division of the fifth nerve, especially the gustatory nerve, and the spinal accessory. The motor nerves were first implicated, as the first symptoms were spasms of the sterno-mastoid and sterno-hyoid and thyroid, and difficulty of swallowing, the loss of taste, never complete, having occurred after the other symptoms.

The treatment was directed entirely against the nerve-debility and was effective. The corrosive sublimate was given, as a nerve tonic, as it seems to possess great powers in these cases. Like other cases this is not so complete as could be wished, the patient having left before he was completely cured. The rapid amelioration of his symptoms indicates that, if any organic change had occurred, it must have been very slight.

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## SURGICAL.

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*Notes of a Case of very large Elephantiasis Scroti.* By  
JAMES IRVING, M.D., Civil Surgeon of Allahabad.

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IN a recent number of the INDIAN ANNALS OF MEDICAL SCIENCE, I placed on record a case of Elephantiasis of the scrotum, in which a tumour weighing 136 pounds was successfully removed; the testes being cut away and the penis saved. Another case has recently come under my observation in which the growth proved, when removed, even heavier; though, unhappily, the patient died a few days after the operation. The following is a brief notice of the latter case, taken from the case book of the Colvin Dispensary at this place.

Isree Mull, Khattari, by trade a Gomashta, aged about 60 or upwards, was admitted on the 25th January, 1867, on account of a very large scrotal tumour which almost touches the ground when the patient stands up. Shape pyramidal, nodulated here and there, especially at the lowest part; the urinary orifice is about the middle of the tumour and in front. There are several white marks here and there, caused by escharotics that have been from time to time applied. The following are the measurements of the tumour. Antero-posterior, commencing at the apex of the tumour in front and terminating at the apex behind, 5 feet 10 inches; lateral passing from apex on one side to the opposite, 5 feet 7 inches; circumference at the middle, 5 feet; length, 2 feet 6 inches; breadth, 2 feet 8 inches.

The patient states that about twelve or fifteen years ago he had hydrocele, on account of which he was tapped on several occasions. About ten years ago, he observed the scrotum enlarging, and he also noticed that the mass had the consistence of flesh. About eight years ago, he suffered from inflammation of the tumour, attended by high fever; and on this occasion it was lanced, and a quantity of purulent matter discharged. The excessive enlargement of the growth dates back from about five. He had frequent attacks of fever, and ague about the time the tumour commenced, and he has been subject to similar attacks since then up to the present time.

The man was very anxious to have the mass extirpated, and had come up from Mirzapore for the purpose. The great danger of the operation to a man of this age, and with a tumour so large, was fully pointed out to him, and as he still desired to have the mass removed, the operation was performed on the 2nd February, 1867.

I was assisted by Drs. Woods and Murray of the 107th Regiment, Dr. Pilcher of the Central Prison, Allahabad, Messrs. Watson and Keegan, apothecaries, and Messrs. Dubnuse and Kaly Dass Nundy, Sub-assistant Surgeons. Chloroform was administered by Dr. Pilcher. Pressure was made on the vessels entering the tumour by means of a doubled piece of strong whip passed through a strong iron ring. By pulling on both ends of the cord, away from the iron ring, very effectual pressure was made. The operation was performed, or rather attempted to be performed in the usual way. An endeavour was made to save both testes and penis, the latter of which was partially dissected out and held back by Dr. Murray, but the hæmorrhage was so alarming and the patient so exhausted, that I thought it absolutely

necessary to conclude the operation as speedily as possible—sacrificing the testicles. The mass was so huge and unmanageable—so little under control that unfortunately I cut off the penis which had been partially dissected out, in sweeping round the tumour with a long catlin, close to the pubis. This having been effected the vessels were speedily secured by means of tenacula and artery forceps, several of which each of the gentleman assisting me had at hand. But before all the bleeding points had been secured, the patient for a time almost ceased to breathe, and death seemed imminent; in fact I thought that it had taken place, as neither pulse nor respiration were for a few seconds noticeable. The chest was rubbed with brandy, which was also poured down his throat. Ammonia and ether were also diligently administered and the pulse slowly and gradually returned. To have milk and Brandy every half hour.

*2nd February*, 6. P. M.—Much better. No bleeding.

“ “ 8. P. M. About an ounce of blood has escaped from the wound. On removing the cold water dressing, two small arterial jets were discovered and tied. Continue the milk and Brandy; and, as he is an opium eater, he was directed to take his accustomed quantity, about four grains, at bed time.

*3rd February*.—Doing very well; slept during the night; no more bleeding, and does not complain of any pain. Continue the milk and Brandy, and to have injections of soup and milk per rectum. To take also three grains of quinine three times a day.

*4th*.—Pulse good; slept all night; wound looks well.

*6th*, 10 A. M.—Had rigors at 4 o'clock P. M., yesterday, after which strong fever came on, and he was at times



delirious; bowels moved once freely this morning; motions natural. Fever now subsiding. There had been a hail storm yesterday, and it appears that some of the hard stones as well as rain got into the room where he was. Took saline mixture while the fever lasted, and then quinine in ten grain doses every two hours.

7th.—Fever returned yesterday at 3 o'clock p. m., attended with rigors.

From this point onwards the case rapidly went from bad to worse. Quinine was given in the hope of stopping the fever but only with partial benefit. His strength, it was attempted to maintain, by means of milk, soup, brandy, wine and even beer and injections of soup, yet he gradually became weaker. On the 13th he was feverish, and his bowels being constipated he had half an ounce of castor-oil given to him. The report for the 14th is as follows:—"Had 11 or 12 motions, the first feculent, but latterly consisting of undigested milk." This looseness went on unchecked by the various remedies employed for its arrest. He also continued to have occasional attacks of fever, and died on the 18th of February.

As soon as the tumour was cut off, it was taken to the station of the East Indian Railway, and there weighed by Mr. Hart, Parcel's Clerk, in presence of Dr. Pilcher, Mr. Keegan and myself, on one of the common railway weighing machines; it weighed 152 pounds, although it is probable that from five to eight pounds of blood and serum had drained away from it between the time it was excised and the time it was weighed. I have been thus particular in giving all those details as to weight of this tumour, as I have heard that the accuracy of the weight in my former case, in which the mass amounted to 136 pounds, has been questioned.

This patient would undoubtedly have had a better chance of life, had I not wasted his blood in a futile attempt to save his penis and testes. It is the more to be regretted that I did not at first shave off the tumour close to the pubis by a couple of sweeps of the knife, seeing that I had to do so in the end. Looking back on the case, it is further subject of regret that a small dose of castor-oil was given to him on the 18th on which date the bowels were confined, although after he had taken the oil they became loose, and so continued in spite of medicine till he died. His having been so very liable to fever for years past was another unfavourable complication of the case, which did not come out prominently till he had his first rigor, when we were informed by the relatives, who attended him, that he was very subject to fever and ague at all times. We were no doubt aware of the fact that he had a tendency to fever, and, therefore, he was ordered quinine the day after the operation; but we did not know, as stated above, that he had intermittent fever so frequently, or in such violent paroxysms as afterwards appeared to have been the case. It might possibly have been better if he had had doses of quinine regularly for a week or ten days before the operation.

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